

Choosing a Contraceptive Method Choice in Asia and the United States

Edited by
Rodolfo A. Bulatao, James A. Palmore,
and Sandra E. Ward



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Foreword

During the last decade, we have witnessed substantially increased sophistication in the evaluation of family planning programs. Better methodologies, such as those involved in analyzing birth intervals, have combined with fuller awareness of consequential explanatory variables, such as the integration of delivery systems with social networks in communities, to allow meaningful advances in our assessments.

One part of our expanded sophistication has come in the area of appraising contraceptive method mixes. On first thought, it may appear that studying the factors that determine contraceptive method choice is overly pedantic. This is true in the sense that such studies are complex, but these studies are also vital to policymakers and program managers in family planning programs.

It is now well known that a good contraceptive method mix is characteristic of almost any successful family planning program. In fact, several measures of "program strength" include information on the number of methods provided as an important component. In this context, knowing what affects the choice of methods by potential clientele should be very valuable in guiding both motivational and service provision aspects of a program.

At the East-West Population Institute, we are often faced with trying to carry out research that is characterized by this difficult balancing act: policy relevant but technically sophisticated. I believe that this volume should satisfy both types of reader—the technical specialist and the program manager. The book represents the state of the art in this field, but it clearly indicates that we are still at the beginning of the process of assessing this important topic.

Plans for the book were made in 1984. In August 1985, most of the authors met at a seminar on the Determinants of Contraceptive Method Choice held at the East-West Population Institute, Honolulu, Hawaii. The seminar was sponsored by the Office of Population, United States Agency for International Development, to which the editors and I express our gratitude. The final versions of the papers, revised several times in response to external reviews and editorial suggestions, are substantially different from those presented at the seminar, and this volume, hence, is not a proceedings.

The research summarized here emphasizes work in Asia and the United States, since that is the focus of work at the East-West Center. Because Asia has been at the forefront in organizing national family planning programs and evaluating them, however, the emphasis is not

entirely inappropriate. Moreover, several chapters in this book provide comparisons with countries outside Asia, and the fourteenth, summary, chapter brings in research from all over the world.

Lee-Jay Cho
Vice President, East-West Center, and
Director, East-West Population Institute

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The findings, interpretations, and conclusions expressed in this volume are the editors' and authors' own. They should not be attributed to the World Bank, its Board of Directors, its management, or any of its member countries, nor should they be attributed to the East-West Center or its Board of Governors.

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1 The Contraceptive Method Mix: An Overview

by James A. Palmore and Rodolfo A. Bulatao

Why do couples choose particular contraceptive methods? Until recently, little research addressed this question, partly because influencing couples to use any method at all was the dominant concern of policymakers. But rapid increases in contraceptive prevalence and accumulated experience with each method have heightened awareness that the choice of method is an important research and policy question. Events illustrating this new awareness are numerous. In the United States, two manufacturers stopped distributing the three most popular intrauterine devices (IUDs) in 1986 because of actual and anticipated lawsuits. This move left only one type of IUD available to U.S. women, at least for two years, and some two million women may have had to change methods (Forrest 1986). Only recently has there been news that a second IUD, the Copper T, will be marketed in the United States beginning in 1988 (Klitsch 1988). In India, the national family planning program's reliance on female sterilization came under increasing attack in the early 1980s (Soni 1984:154 ff.). Promoting the availability and use of contraceptive methods for spacing births as well as preventing them is receiving more attention there and elsewhere (e.g., India, Ministry of Health and Family Welfare 1984, 1985a, 1985b).

In Asia today there are striking differences in the use levels of available methods. Notable is the relative popularity of IUDs in China, oral contraceptives in Indonesia and Malaysia, condoms in Singapore and Japan, and rhythm and withdrawal in the Philippines and Sri Lanka, as is the dramatic rise in sterilizations in many countries (UN, Department of International Economic and Social Affairs 1984:table 6; Population Problems Research Council, Mainichi Newspapers 1984:91; Tey et al. 1985:28; Nortman 1985:table 18). Equally noteworthy are shifts in method use over time, such as the Republic of Korea's change in emphasis from an IUD program in the mid 1960s to one including oral contraceptives in the late 1960s and early 1970s, to one in which female sterilization became the most popular method in the late 1970s and the 1980s (Moon et al. 1973:102; Cho et al. 1984:14).

Two recent comprehensive reviews have recognized the need for more information about the factors underlying contraceptive choice. One was a thorough examination of fertility determinants in the developing countries, undertaken by a U.S. National Academy of Sciences panel, which identi-

fied contraceptive choice as one of the important unresolved issues (Bulatao and Lee 1983, Vol. 2:813). The other was the most recent United Nations' assessment of levels and trends in contraceptive use worldwide, which also stressed the need for additional research on this topic (UN, Department of International Economic and Social Affairs 1984:36 ff.; UN, ESCAP 1985:6 ff.). The World Health Organization's Special Programme of Research Development and Research Training in Human Reproduction has identified contraceptive choice and decision as a priority area for research, and several other major funding agencies, including the U.S. Agency for International Development (AID), are attempting to provide financial support for new research.

This book begins to assemble the needed knowledge. It presents evidence from recent investigations of contraceptive method choice in a variety of countries, focusing on Asia and the United States. Included are discussions of psychosocial and economic approaches to understanding method choice, descriptive and statistical analyses of choices, and an integrative summary that concludes the volume.

In this chapter, first we sketch a framework for investigating contraceptive method choice. Second, we explain how the individual chapters are meant to illuminate the framework. Third, we provide background for the other chapters: an overview of contraceptive prevalence and the method mix in Asia and the United States, and a description of major factors involved in making contraceptives available, leading to questions about individual choices for the other chapters to consider.

A FRAMEWORK FOR INVESTIGATING METHOD CHOICE

The process of choosing a contraceptive can be pictured as a funnel: a wide range of possible methods is gradually reduced to a small selection and eventually to a single choice by cultural, economic, technical, psychological, and other factors. This analogy will be developed here as a simple means of representing many interrelated factors important in contraceptive method choice.

Figure 1.1 illustrates the main idea. At the top of the funnel, many methods may be listed, including now common ones such as the condom and the pill, and also exotic ones such as herbal preparations and futuristic ones such as biodegradable implants and contraceptive vaccines. At the bottom of the funnel, the individual (or couple) chooses one method (or occasionally a combination of methods) out of those available. The spectrum of available methods is gradually narrowed as one moves down the funnel. This movement will be described and qualified where necessary, and then movement in the opposite direction, from the bottom up, will be discussed.

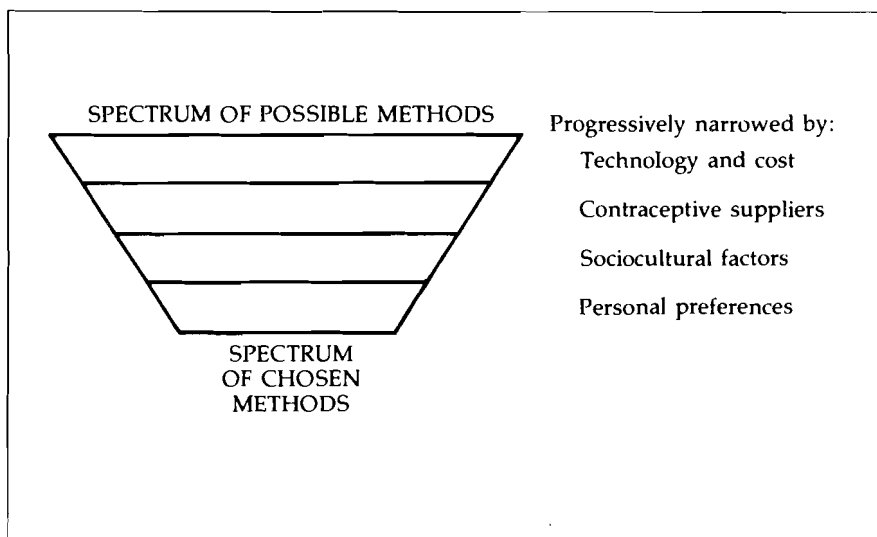


Figure 1.1. A model of factors in contraceptive method choice

Moving downward, one can divide the relevant factors, somewhat arbitrarily, into four groups: technology and cost, contraceptive suppliers, sociocultural factors, and personal preferences. Technological developments broaden the spectrum of methods but also make some methods obsolete. Economic cost influences decisions on whether a method will be mass-produced, just as it influences decisions on whether a method will be filtered out at other stages.

Contraceptive suppliers determine whether technically feasible methods become accessible to individuals. Suppliers form a hierarchy, from international drug companies, through such intermediaries as AID, all the way down to women supplying other women with particular methods. This hierarchy of suppliers might itself be seen as constituting a shorter funnel within the main funnel.

Sociocultural factors partly determine which contraceptive methods, among those actually within reach of the ultimate consumer, are chosen. Such factors as education and income have been shown to affect choice between contraception and no contraception, and they are investigated here for their effect on choice of specific methods. Other sociocultural factors, such as religion, social position, and particular customs, as well as transient factors such as publicity and rumor, might also be significant filters.

The ultimate filter is the individual and his or her personal preferences. Such preferences are tied in with sociocultural factors and may or may not be treated as distinct from them. The outcome of the filtering process may be the choice of a given method at a given time. If the bottom of the funnel is seen as representing not an individual but a group, the array of choices they make would give rise to a particular method mix at the bottom of the funnel, somewhat different from the mix poured in at the top.

Three qualifications should be added to this description: that the funnel may be broadened to include other behaviors that influence fertility; that successive layers may filter out methods not in an absolute but in a relative sense; and, most important, that priority of action in the funnel does not always move downward.

Only contraceptive methods are represented in the funnel. For other purposes, however, the funnel should be thought of as somewhat broader, encompassing breastfeeding, postpartum abstinence, induced abortion, marriage delay, spousal separation, and other behaviors that can also affect fertility. Whether these other behaviors are part of the menu of acceptable alternatives can favor one contraceptive method over another. For instance, the availability of induced abortion and menstrual regulation as backup methods may permit wider use of less reliable contraceptive methods (although the relationship may also work in the other direction).

The characterization of the process as a series of filters implies successive narrowing of method options. It is more accurate to say, in most cases, that filtering does not absolutely prevent particular methods from reaching the consumer (or consumers from obtaining the method). Instead, it attaches costs to some methods and possibly benefits to others, effectively skewing the eventual mix. To maintain the analogy, one might think of methods that become costlier as being pushed into a gray area outside the funnel, farther from the focus of consumer attention.

The description so far implies that factors higher up in the hierarchy constrain the operation of factors lower down. However, the funnel can also be viewed from the other direction: factors at the bottom of the hierarchy sometimes have prior effects. Consider a contraceptive supplier deciding on which methods to provide, or a medical scientist deciding on which methods to develop. Both of them would sensibly take account of consumers' personal preferences and the cultural factors underlying them. Or consider the contraceptive consumer—for him or her, personal preferences are often primary, followed by a subsequent search for appropriate suppliers or even, in exceptional cases, attempts to encourage the supply of certain methods. Thus, explanations for method mixes are complicated by the interaction between the supply of particular methods, from the top, and the demand for particular methods, from the bottom.

ORGANIZATION OF THE BOOK

The central concern of this book—with individuals (or couples) and their choices—is explicable within this framework as the bottom-up rather than the top-down perspective. Various other reports, for example many in the Population Reports series (e.g., Sherris et al. 1985), have looked at the problem from the top: what technology is available or might be developed or more effectively promoted. We choose to look at the problem from the bottom: how contraceptive consumers choose among the options they have.

Neither perspective is complete by itself; each requires recognition of factors operating in the reverse direction. In taking the consumer perspective, this book does not elaborate on contraceptive technology, but it often refers to characteristics of contraceptives as individuals perceive them. Similarly, most chapters skate quickly over the history of contraceptive distribution and the logistics of contraceptive supply, but they often allude to individual access as a factor in choice of particular methods. Most chapters focus heavily on individual and social characteristics in method choice.

The chapters in Part I describe various perspectives for interpreting individual method choices—filters you perceive when you look upward through the funnel. The first perspective, considered in Chapter 2, by Andrew R. Davidson, is the psychological, which interprets choices with reference to personal attitudes and values. If psychology is important, not only the psychology of consumers but also the psychology of contraceptive providers should be considered. Chapter 3, by Lawrence J. Severy, therefore considers physicians' perceptions as they modify contraceptive choices. Distinguishable from psychological factors, though also at least partly matters of perception, are access considerations, which define the perspective of Chapter 4, by Elise F. Jones. We have already noted that whether a method passes through the funnel is not an all-or-nothing phenomenon; rather, it involves relative costs. Accordingly, Chapter 5, by J. Brad Schwartz et al., adopts an economic perspective in interpreting variations in choice.

The chapters that follow deal with individual countries, most of them Asian. The focus on single countries is the equivalent of looking through separate funnels, each involving somewhat different filters, except for the technology filter at the very top.

The focus on Asia is attributable to our interests and the regional orientation of the East-West Center, which provided much support for this work. Moreover, the Asian focus is appropriate to the subject. Asia has the longest-running family planning programs, ranging from extremely successful to largely ineffective, with contrasting methods favored in various countries. Substantial variability certainly exists in culture, psychology, economics, and other factors that serve as filters.

Asian diversity does not, of course, account for all of the modern diversity in contraceptive choice worldwide. Three things are done here in an

attempt to offset any regional bias. First, several chapters of Part I also provide comparable analysis of non-Asian countries—Egypt, Mauritius, Peru, Jamaica, and the United States. Second, the United States is one non-Asian country treated in detail, as a highly contrasting case, at least on the surface. Third, the concluding chapter of the book, which assays generalizations, draws not only upon the Asian and U.S. research detailed here but also on research from other regions.

In Part II, the authors consider contraceptive choices in six Asian countries. Chapters 6, 7, and 8, by Minja Kim Choe and Insook Han Park, Julie DaVanzo et al., and Aphichat Chamratrithirong and Elizabeth Hervey Stephen, respectively, which focus on East and Southeast Asian countries, follow a similar formula: an overview of trends in contraceptive method mix, followed by analysis of individual or household-level survey data on method choices. Each chapter considers an array of methods simultaneously and assesses the effects of method characteristics, access, and personal factors jointly. Conclusions are specific to each country but also suggest some general features of the contraceptive choice process, which are taken up in the concluding chapter. The other chapters in Part II, on South Asian countries, are more diverse. Chapter 9, by Indra Gajanayake, has a method focus: on traditional methods in Sri Lanka, where they command an atypically large share of method use. Chapter 10, by J. R. Rele et al., has a psychosocial focus: a variety of methods in India is discussed and attitudinal survey responses are used to illuminate reasons for choice. And Chapter 11, by James F. Phillips et al., has an access focus: it analyzes the effects of an experimental outreach intervention in Bangladesh.

Part III provides a contrast in setting, looking at method choice in the United States. In methodology the two chapters in this part are similar, providing analysis of survey data, but in focus they contrast with and complement each other. Chapter 12, by Ronald R. Rindfuss et al., looks at current contraceptive decisions, leaving out couples previously sterilized, and interprets the decisions with reference to standard socioeconomic classifiers. Chapter 13, by Warren B. Miller et al., looks only at sterilization decisions, and interprets them primarily with reference to a substantial array of attitudinal variables and variables relating to social interaction.

Chapter 14, by Rodolfo A. Bulatao, attempts to draw together and systematize the various insights about why individuals choose particular contraceptive methods. An additional framework is proposed for looking at factors in method choice. From the individual's perspective at the bottom of the funnel, the chapter argues that the major filters perceived can be grouped under four headings: contraceptive goals, involving the specific fertility effects sought through contraception; contraceptive competence, or the ability to use particular methods effectively; contraceptive evaluations, covering judgments of the moral and practical implications, includ-

ing the side effects, of using specific methods; and contraceptive access, involving not only availability but also method promotion and costs. Evidence relating to choices is reviewed, this time method by method rather than country by country, with reference to this framework.

The statistical methodology needed to investigate individual choice is complex, given the number of choices involved, the number of variables that may affect choice at a given time, and both life-cycle and time-period variations. An appendix, Chapter 15, by Minja Kim Choe, describes the application of multinomial logit analysis, an appropriate statistical approach adopted in several chapters.

The remainder of this introductory chapter provides general background for the following chapters. The actual method mixes in Asia and the United States are reviewed and trends discussed. Then, taking a cross-national view and essentially a view from the top of the funnel, we make various observations about developments leading to these mixes. Questions about individual choices follow naturally from these overviews.

CONTRACEPTIVE PREVALENCE AND THE METHOD MIX

Owing to economic development and planned diffusion, contraceptive prevalence has increased very substantially in most Asian countries. But prevalence levels vary by region.

In East Asia, all of the major nations now have prevalence rates similar to those in the developed world (Table 1.1). China, Hong Kong, the Republic of Korea, and Taiwan have current practice rates of around 70 percent, almost identical to the U.S. rate. In Japan, which records a somewhat lower contraceptive practice rate, the use of induced abortion supplements contraceptive practice to yield low fertility.¹

The situation in Southeast Asia is less consistent. Singapore and Thailand have achieved "modern" levels of contraceptive use (74 and 65 percent, respectively); but Indonesia, Malaysia, and the Philippines have not yet reached those levels (Table 1.2). In Malaysia, current use had exceeded 50 percent by 1984–85. In Indonesia, current use was at least 46 percent by 1987 (Warwick 1986:480; Indonesia, Central Bureau of Statistics 1986, 1988). Hence, both Malaysia and Indonesia seem to be approaching the levels of Singapore and Thailand. Data for the Philippines, on the other hand, indicate a slightly slower and less consistent increase in contraceptive adoption.

South Asia, with the exception of Sri Lanka, has the lowest prevalence rates in Asia (Table 1.3). Despite having the oldest national family planning program, India still had only one-third of its couples using contracep-

1. Table 1.1 and the subsequent three tables omit information on induced abortion because the survey data on abortion use are unreliable for many countries.

Table 1.1. Percentage of currently married women, ages 15-49, ever using contraception and currently using contraception, by method: East Asia, selected countries and years
(Sample survey estimates)

Country	Year	Percentage ever using contra- ception	Percentage currently using con- traception	Percentage distribution of current contraceptive use, by method used							
				All methods	Sterilization			Pill	IUD	Con- dom	Other methods
					Female	Male	Both				
China ^a	1982	u	69	100	25	10		8	50	2	4
Hong Kong ^b	1967	u	43	100	21	2		25	20	11	21
	1972	65	50	100			23	36	10	7	24
	1977	88	72	100			26	32	4	18	31
	1982	90	72	100	27	2		27	5	20	19
Japan ^c	1950	29	20	100			u	u	u	36	70
	1955	52	34	100			4	u	u	57	47
	1959	63	42	100			6	u	u	58	48
	1967	72	53	100			4	c	6 ^c	65	30
	1971	73	53	100			4	c	10 ^c	73	25
	1975	82	60	100			5	c	12 ^c	78	21
	1979	84	62	100			4	c	12 ^c	81	14
	1984	81	57	100			u	c	12 ^c	78	12
							12	3	46	15	26
Republic of Korea ^d	1966	27	20	100							
	1971	44	25	100	4	9		28	29	13	17
	1974	57	37	100	5	9		24	23	15	24
	1976	63	44	100	9	10		18	24	14	26
	1979	76	54	100	27	11		13	18	10	22
	1982	81	58	100	40	9		9	12	12	18
	1985	84	70	100	45	13		6	11	10	16

Taiwan Province of China ^e	1965	27	23	100	24	3	49	e	25 ^e
	1967	39	33	100	17	8	57	5	13
	1973	68	55	100	16	10	50	6	17
	1976	73	61	100	18	11	44	6	21
	1980	81	68	100	25	9	32	12	22
	1985	90	78	100	33	7	25	17	18

u = unavailable.

^aSource: Qiu et al. (1984:139, 143).

^b1967 figures are for women 15–44; other years are for women 15–49. Sources: 1967 figures are calculated from Mitchell (1972:248–249); figures for 1972–1982 are from Chan (n.d.:36) and Liu (1984:35, 38, 40).

^cFor the years between 1967 and 1984, pills are included with IUDs. Source: Population Problems Research Council, Mainichi Newspapers (1984: 86, 91). Multiple responses were permitted for current method used.

^dAll figures are for women 15–44, except for 1974; the 1974 figures are for women 15–49. Sources: Nam Hoon Cho et al. (1984: 14); Byung Tae Park et al. (1979:181); Republic of Korea, Ministry of Health and Social Affairs (1966:166, 168); Republic of Korea, BOS, EPB, and KIFP (1977:121); Korean Institute for Population and Health (1985:74–75). Current use by method is not available for the 1964 Korean survey; hence, figures for 1964 are not presented here.

^eFigures are for women 20–39. For 1965, condoms are included with other methods. Sources: Calculated from Chang et al. (1981:222–223, 225); Chang and Jain (1970:258); Chang et al. (1986).

Table 1.2. Percentage of currently married women, ages 15-49, ever using contraception and currently using contraception, by method: Southeast Asia, selected countries and years
(Sample survey estimates)

Country	Year	Percentage ever using contra- ception	Percentage currently using con- traception	Percentage distribution of current contraceptive use, by method used							
				All methods	Sterilization			Pill	IUD	Con- dom	Other methods
					Female	Male	Both				
Indonesia ^a	1976	24	18	100	1	0		63	22	8	6
	1979	u	31	100	1	0		53	20	3	21
	1980	u	27	100	a	a		53	25	3	18 ^a
	1985	u	39	100	3	1		40	32	2	22
	1987	u	46	100	7	0		31	29	3	30 ^a
Malaysia ^b (Peninsular)	1966-67	14	9	100	b	b		46	2	9	42 ^b
	1970	27	16	100	b	b		75	b	b	25 ^b
	1974	53	33	100	10	1		51	2	9	27
	1984-85	77	51	100	15	b		23	19 ^b	b	43
Philippines ^c	1968	19	16	100	0	0		8	6	c	86 ^c
	1973	28	18	100	c	c		40	15	4	41
	1978	58	36	100	13	2		12	6	10	56
	1983	u	32	100	28	1		17	8	6	39
	1986	u	44	100	23	1		14	5	3	54
Singapore ^d	1973	77	60	100			18	29	5	23	24
	1977	86	71	100	29	1		24	4	29	12
	1982	u	74	100	30	1		16	d	33	21 ^d

Thailand ^e	1969-70	19	15	100	37	14	26	15	e	8 ^e
	1972-73	34	26	100	26	11	40	17	0	6
	1975	45	37	100	20	6	41	18	1	14
	1978	69	53	100	24	7	41	7	4	16
	1981	76	59	100	32	7	34	7	3	17
	1984	82	65	100	36	7	31	8	3	16

u = unavailable.

^aSterilization is included with other methods in 1980. The injectable, included with other methods, accounted for 21 percent of current use in 1987. Sources: Indonesia, Central Bureau of Statistics (1977:101, 122; 1981:39); UN, Department of International Economic and Social Affairs (1984:43).

^bAll figures are for women 15-44. In 1966-67, sterilization is included with other methods. In 1970, all methods except the pill are tabulated as other methods. In 1984-85, male sterilization is included with IUDs and condoms. Sources: Malaysia, National Family Planning Board (1968:84; Malaysia, Department of Statistics (1971:42, 44); Chander et al. (1977:135, 143); Arshat and Subbiah (1987:9, 29).

^cA high proportion of other methods in the Philippines are rhythm and withdrawal. For 1968, the source is Family Planning Evaluation Office, University of the Philippines Population Institute (1973:86). Condoms are included with other methods. For 1973, the source is Laing and Phillips (1975:96). Sterilization is included with other methods. For 1978, the sources are UN, ESCAP, Population Division (1985:21); Philippines, National Census and Statistics Office et al. (1979:126). The rows for IUD and condom are interchanged in the source for the 1978 percentages. For 1983, the source is UN, ESCAP, Population Division (1985:22). For 1986, the source is Concepción et al. (1987).

^dAll figures are for women 15-44. In 1982, the percentage currently using IUDs is included with other methods. For 1973, the source is Wan and Saw (1974). These figures, which we believe to be accurate, are different from those reported in UN, Department of International Economic and Social Affairs (1984:43). The figures on sterilization are reported separately from the other methods in the Wan and Saw report, and this does not seem to be taken into account in the UN source. Figures for 1977 and 1982 are from Chen et al. (n.d.:55) and Emmanuel et al. (1984:22).

^eAll figures are for women 15-44. Injectables are a high percentage of the other methods in Thailand. In 1969-70, the percentage currently using condoms is included with other methods. Sources: Kamnuansilpa and Chamrathirong (1985:41, 45); Suvanajata and Kamnuansilpa (1979:35); Knodel and Debavalya (1978:39-40).

Table 1.3. Percentage of currently married women, ages 15–49, ever using contraception and currently using contraception, by method: South Asia, selected countries and years
(Sample survey estimates)

Country	Year	Percentage ever using contra- ception	Percentage currently using con- traception	Percentage distribution of current contraceptive use, by method used							
				All methods	Sterilization			Pill	IUD	Con- dom	Other methods
					Female	Male	Both				
Bangladesh ^a	1976	16	8	100	4	6		37	5	9	39
	1979	21	12	100	20	7		30	2	12	29
	1981	u	19	100	21	4		19	2	8	45
	1983	35	19	100	32	6		17	5	8	31
	1985	u	25	100			37	20	6	7	29
India ^b	1970	18	14	100	20	26		2	5	18	29
	1980	39	35	100			63	3	1	12	21
Nepal ^c	1976	4	2	100	4	67		17	4	8	0
	1981	9	7	100	34	42		16	1	6	1
Pakistan ^d	1975	11	5	100	17	2		19	11	19	32
Sri Lanka ^e	1975	43	32	100	29	2		5	15	7	42
	1982	66	55	100	31	7		5	5	6	47

u = unavailable.

^aFigures for 1979, 1981, and 1983 include married women under age 15. Sources: UN, ESCAP, Population Division (1985:8-10; Carrasco (1981:28, 46); Bangladesh, National Institute of Population Research and Training (1981:46, 61, 75); Mitra and Kamal (1985:124, 159); Mabud (1987:table 6).

^bAll figures are for women 15-44. Sources: Operations Research Group (n.d.:31-33); M. E. Khan and Prasad (1983:112, 120).

^cSources: Carrasco (1981:52-57); Nepal Family Planning and MCH Project, Ministry of Health (1977:66); Nepal Family Planning and MCH Project, Ministry of Health, and Westinghouse Health Systems (1983:104, 119).

^dSources: Carrasco (1981:28); UN, ESCAP, Population Division (1985:20); Population Planning Council of Pakistan (1976:92-93, table 4.4.1); Shah (1979:166-167). Current use by method is not available for the 1968 National Impact Survey. Hence, figures from that survey are not presented here.

^eRhythm is the main other method in Sri Lanka. Source: Gaminiratne (1983:64, 70). Also see Hanenberg (1987:annex 1).

tives in 1980. Recent acceptor statistics indicate some improvement there (e.g., India, Ministry of Health and Family Welfare 1985b), but use is lower than in East Asia or the developed countries. Rates in Bangladesh and Pakistan are even lower than in India. In Bangladesh, the current practice rate was less than 20 percent as recently as 1983 (M. R. Khan et al. 1985 review some of the reasons) and had just reached 25 percent in 1985. In Pakistan, the only published survey estimates of prevalence are from the National Impact Survey of 1968 and the World Fertility Survey of 1975, both of which recorded that only 5 percent of Pakistani women were current users. Preliminary figures from a 1979-80 survey indicate that contraceptive use in Pakistan may have even declined between 1975 and the survey period (Soomro and Ali n.d.), but unpublished figures for the mid-1980s indicate that prevalence may have exceeded 10 percent. Thus, considerable scope still exists for increased contraceptive use in most of South Asia.

For many Asian countries with high prevalence levels, those levels were reached through spectacular annual rates of increase. In the Republic of Korea, for example, prevalence rose from 20 percent to 70 percent in less than 20 years. Thailand's rapid progress has been labeled a "contraceptive revolution" (Knodel and Debavalya 1978). China's present level must have been attained through similarly swift changes, although direct evidence on prevalence is available only for 1982. Singapore too must have achieved its high prevalence levels rapidly, but the pace of its achievement is undocumented because the earliest survey, in 1973, reported current use already at 60 percent. The rise in rates for Taiwan, Sri Lanka, West Malaysia in the early years of its program (1966-74), Japan during 1950-67, and Hong Kong was also steep.

Asia's prevalence rates, then, are characterized mainly by their diversity. Similar diversity is evident in the choice of methods in the various countries, both today and in the past. Female sterilization is now the most widely used method in Bangladesh, Hong Kong (where it is tied with the pill), India, the Republic of Korea, the Philippines, Singapore, Sri Lanka, and Thailand. The pill is most popular in Hong Kong (along with female sterilization), Indonesia, Malaysia, and Pakistan (where it was tied with the condom in 1975). Male sterilization has the highest proportion of users in Nepal. The IUD is most used in China and Taiwan. Condoms are the favored method in Japan and Singapore and were tied for first place with the pill in Pakistan in 1975.

Thus, no one method has become a favorite throughout Asia. In fact, the method mix within each country seldom shows any method used by 50 percent or more of all current users. The exceptions are in Japan, where 78 percent of users were using condoms in 1984; China, where IUDs accounted for 50 percent in 1982; and India, where sterilization (mostly female) represented 63 percent of current use in 1980. The more common

pattern is illustrated by Hong Kong, where in 1982 female sterilization (27 percent), the pill (27 percent), and condoms (20 percent) had almost equal popularity. Similarly, in Taiwan in 1985, sterilization and the IUD, the two most used methods, were within 8 percentage points of each other but together accounted for only 58 percent of all current use. In Thailand (1984), the pill and female sterilization each accounted for about one-third of total use. In Sri Lanka, female sterilization and rhythm (shown in Table 1.3 with "other" methods) were almost tied in popularity in 1982, each accounting for one-third of all use.²

Historical changes in method choice are also striking. In many countries, use of female sterilization has increased at the expense of other methods. The Republic of Korea's experience has already been mentioned. Other shifts in method mix over time have been evident in the Philippines, Thailand, and Bangladesh, where the IUD has never been very popular but widespread use of the pill seems to have given way to greater use of female sterilization.

In other countries, contraceptive choice has shifted toward effective methods, though not necessarily sterilization. In Japan, the shift from "other" methods—including rhythm, withdrawal, abstinence, and foam—to the condom is notable; the percentage of current use accounted for by "other" methods declined from 70 percent to 12 percent between 1950 and 1984. In the Republic of Korea, the "other" method category declined from 26 percent in 1966 to 16 percent in 1985. Similar decreases, some smaller and others larger, occurred in Hong Kong between 1977 and 1982, West Malaysia between 1966–67 and 1974, the Philippines between 1968 and 1983, Singapore between 1973 and 1977, Taiwan between 1980 and 1985, Bangladesh between 1981 and 1983, and India between 1970 and 1980. In a few countries and time periods, shifts toward greater use of the "other" methods occurred: Bangladesh (1979 to 1981), Sri Lanka (1975 to 1982), Thailand (1969–70 to 1984), Singapore (1977 to 1982), Indonesia (1976 to 1980), Malaysia (1974 to 1984–85), and Taiwan (1967 to 1980). The shift to more effective methods has been the predominant trend, however.

Some of this shift may be related to a desire for smaller families. As desired family size decreases, a higher percentage of contraceptors should choose methods for terminating childbirth rather than reversible methods more acceptable for spacing purposes.

Recent contraceptive practice in the United States is similar to that in many Asian countries. Although the U.S. population attained high levels

2. Two surveys conducted in Sri Lanka within a few months of each other give very different total prevalence rates (43 percent versus 55 percent). The differences are based mainly on differences in reported use of "other traditional methods." The data reported here are from the 1982 Contraceptive Prevalence Survey. For a discussion of the two surveys, see Hanenberg (1987).

of contraceptive use earlier than most Asian states, practice patterns since 1965 show two now-familiar trends, an increase in female sterilization and decreases in the use of the pill and "other" methods (Table 1.4).

To find out whether these data on the contraceptive mix across countries lent themselves to systematic interpretation, we attempted a simple cross-national analysis for the Asian countries, using data from roughly the time periods shown in Tables 1.1–1.3. Regressions were run on the pooled data across countries to predict the share of contraceptive users commanded by each method. The regression results are presented in Appendix Table 1.1.

Essentially, the results confirm the significance of the increase in the share of users relying on sterilization over time and indicate that IUD use, by contrast, has fallen significantly. These changes are evident even when socioeconomic factors and regional differentials are controlled. In contrast to these changes over time, higher contraceptive prevalence is linked to greater relative dependence on the IUD and to less dependence on methods other than the IUD, sterilization, and the pill. High prevalence in Asia seems to depend, at least up to now, on mass marketing of more effective methods.

Regional differences within Asia are significant in this analysis. They include greater resort to the IUD in East Asia and greater resort to the pill and "other" methods in Southeast Asia.

Particular socioeconomic factors are also related to the method mix. Higher educational attainment in a country reduces the share of sterilization and increases the share of "other" methods, greater newspaper circulation reduces the share of the IUD and increases the share of the pill, and a higher number of physicians per capita reduces the share of the pill and increases the share of "other" methods. These regression effects imply that

Table 1.4. Percentage of currently married women, ages 15–44, currently using contraception, by method: United States, selected years

Year	Percentage currently using contraception	Percentage distribution of current contraceptive use, by method used						
		All methods	Sterilization		Pill	IUD	Condom	Other methods
			Female	Male				
1965	64	100	7	5	24	1	22	41
1970	65	100	8	8	34	7	14	28
1973	70	100	12	11	36	10	14	17
1976	68	100	14	13	33	9	11	19
1982	68	100	26	15	20	7	14	17

Sources: Figures for 1965–73 are from Westoff (1976:56–57). For 1976, the source is Mosher (1981:3, 17). For 1982, the source is Pratt et al. (1984:20).

different channels for communication about contraceptive methods are important, and that these channels may spread information about disadvantages as well as advantages.

INFLUENCES ON THE METHOD MIX

The highly varied patterns of present and past contraceptive use in Asia and the United States apparently result from a complex aggregation of determinants, changing over time, varying across groups of countries, and involving at a minimum filters relating to delivery systems and communication channels. Viewing things from the top of the funnel, we consider initially the selective provision of contraceptives as a determinant of method mix. Then we argue that delivery systems carry not only contraceptives but also information, and that they can also be seen in the context of interlinked personal networks and personal preferences. The discussion leads toward some broad questions for subsequent chapters.

Selective Provision and Accessibility

Many programs, public or private, claim they offer a "cafeteria" approach to method selection. In reality, few programs could fill a tray for someone really interested in all the methods.³ The limitation of choice was probably an important characteristic of most national programs in Asia during their formative stages, and it remains problematic today (see, e.g., Warwick 1986; Hanenberg 1987). The title of an early publication of the International Planned Parenthood Federation was apropos: *People Without Choice* (Abel-Smith 1974). Only recently have we begun to witness greater possibilities for individual method choice.

The reasons for the selective provision of contraceptives are many. The role of international funding agencies is one important factor (Retherford and Palmore 1983:316 ff.). Few would deny the strong influence of USAID in the Philippine government's provision of oral contraceptives, of the Swedish International Development Agency (SIDA) in supplying orals for the Malaysian program at its inception, or of the Population Council in promoting the IUD at the start of the Korean and Taiwanese programs. Unfortunately, donor impact has been a neglected research topic; only a few studies of specific agencies (e.g., Population Council 1978; Salas 1979; and World Bank 1972) and several case studies (Warwick 1982, 1986) have been done thus far.

A second factor is the strategies of the national programs themselves. Some began by concentrating on urban areas, others by emphasizing the

3. One-fifth of Mauldin and Lapham's 1982 "Program Effort Scale" (see Sherris et al. 1985) is based on the availability and accessibility of six methods. This indicates that method availability does differentiate among programs, with few programs providing a full range of services.

rural sector. Malaysia, for example, began its national program in urban areas of West Malaysia, only later expanding the program to cover rural areas and East Malaysia (Nor Laily Aziz 1981:327 ff.). The Republic of Korea, in contrast, had a rural program first (see Kim et al. 1972 for a review of the early program) and put so much emphasis on the rural areas that urban areas suffered from neglect in the early 1970s (Chung et al. 1972:36 ff.). Emphasis on particular areas of the country by a national program affects not only overall prevalence levels, but also the method mix, because methods available from nongovernmental sources may differ from the officially promoted methods.

National programs, of course, also emphasize certain contraceptive methods to the exclusion of others. The program in India is a case in point (Cassen 1978: chap. 3). Over the course of 30 years, it repeatedly shifted its emphasis, first from "other" methods to the IUD, then to male sterilization, and then to female sterilization as the main program methods. In the mid 1970s, program progress was interrupted by excessive zeal in promoting male sterilization (Srikantan et al. 1984). Currently, the Indian government seems intent on moving toward a cafeteria approach (India, Ministry of Health and Family Welfare 1984, 1985b), for it has improved the provision of IUDs and is talking of a large, new social marketing project.

The central point behind these observations is that accessibility, broadly defined, determines method choice. Accessibility may be restricted at the national level, for example by legal restrictions on the import or manufacture of certain methods, or it may be restricted because of unequal availability in different areas of the country.

Within countries, the location of clinics close to or far from potential clients, clinic hours, and related program decisions may affect use rates for methods that require supplies (e.g., pills and condoms) or medical intervention (IUD insertion, sterilization). Accessibility includes not only such geographic considerations but also costs (economic accessibility) and knowledge on the part of potential clients of reproductive processes and family planning (cognitive accessibility). Population information, education, and communication (IEC) campaigns influence cognitive accessibility. Program quality can also be considered an aspect of accessibility (Chai Bin Park et al. 1977).

Constraints on accessibility are inevitable, and no country avoids them fully. A major determinant of accessibility is physicians' preferences for particular methods. Sometimes sound technical reasons govern decisions—for example, lack of approval for a method from an agency such as the U.S. Federal Drug Administration. Cultural and religious sensitivities of program administrators may also be involved. Whether the public or private sector is more active in contraceptive supply can affect access. Limited budgets and variable costs associated with particular methods, differential costs for

alternative sites for constructing clinics, alternative personnel combinations, and the like may also be responsible.

Selective provision and accessibility, then, is one basic theme underlying analyses of individual method choice. The key questions raised are two. First, are the effects of funding agency support, national program strategies, legal restrictions, clinic siting, and other such high-level decisions visible when individual choices are compared? Second, do such effects of access to methods dominate all other effects, or are they merely one influence among many? Chapters 4 and 5 deal with such questions at the conceptual and cross-national level, and Chapters 6, 7, 8, 10, and 11 deal with them in individual country settings.

Delivery Systems, Personal Contact Networks, and Personal Preferences

Besides providing differential access to particular methods, delivery systems can skew choices in more subtle ways, because such systems necessarily involve social interaction between service provider and program client. The provider, at the terminus of the delivery system—physicians, outreach workers, and the like—may in fact be viewed as one part of a client's personal contact networks, within which the client works out preferences and goals over time. The effects of such networks on method choice are known to be significant (e.g., Palmore 1968; Palmore et al. 1977).

A summary by Perkin and Saunders (1979) of the prevailing wisdom on the interrelationship between delivery systems and specific contraceptive methods (Table 1.5) actually focuses not on access but on these social interaction aspects of the delivery system. It assumes a juxtaposition of two important sets of preferences and goals: those of clients and those of providers. Sometimes the goals of the two groups are in conflict, as, for example, when a method target system is in use and a client happens not to want the particular method offered. Neither targets nor incentive and disincentive schemes can be ignored in thinking about the preferences of clients and providers (Palmore and Yap 1987).

What is the basis for provider preferences? What effect do they have on client choice? How does the nature of the interaction modify their impact on the client? These are the types of issues considered, cross-nationally, in Chapter 3, and in a specific country context in Chapter 11. Given the intricacies of these issues, only a start is made here in resolving them.

Clients, of course, bring to the interaction with the provider their own preferences, formed from other interactions and personal motivations. They bring specific goals that dictate particular methods. The decision to end childbearing makes the choice of a terminal method appropriate, whereas such methods as condoms and rhythm may be used to space births. Perkin and Saunders (1979) have summarized the prevailing wisdom on the

Table 1.5. Appropriateness of contraceptive methods, by delivery system

Contraceptive method	Delivery system				
	Private family planning clinic	Private physician	Health system	Subsidized commercial distribution	Community-based distribution
Condom	○		○	***	***
Vaginal methods	○		○	***	***
Oral contraceptive IUD	+	+	○	***	***
Injectable	***	***	***		
Sterilization	***	+	***	+	+
Abortion or menstrual regulation	***	***	***		

Source: Perkin and Saunders (1979:1).

○ = Less appropriate.

+

*** = Most appropriate.

appropriateness of specific contraceptive methods at particular stages in the life cycle (Table 1.6).

Clients also bring other personal variables. Ethnic and religious values lead to preferences for specific methods. Some methods, such as rhythm or the diaphragm, may be avoided by national programs (and hence be relatively inaccessible) because of their limited effectiveness but may be preferred by individuals for religious reasons or because of real or perceived harmful side effects of the alternatives.

Can the contraceptive user's goals and preferences be measured, or proxied, by other variables? What are their effects on method choice, and how do these effects compare in magnitude with the effects of access? What are the effects of socioeconomic status and other social characteristics of individuals, and how large are these? Chapters 2 and 13 deal with such questions from a predominantly psychological perspective. Many of the other chapters also devote some attention to social characteristics as determinants of choice.

CONCLUSION: POLICY LINKAGES

The framework we have presented suggests that policies on contraceptive development and distribution should be informed wherever possible by an understanding of the factors in individual method choices. How people choose contraceptives affects many decisions. It affects which methods are

Table 1.6. Appropriateness of contraceptive methods, by stage in reproductive life

Contraceptive method	Stage in reproductive life		
	Before first birth (for delay)	After first birth (for spacing)	After all desired births (for termination)
Condom	+		
Vaginal methods	+		
Oral contraceptive	**	+	
IUD	+	**	
Injectable		**	+
Sterilization			**
Abortion or menstrual regulation back-up throughout		

Source: Perkin and Saunders (1979:9).

+ = Appropriate.

** = Most appropriate.

appropriate for various subgroups in a population. It affects the degree of emphasis to be placed on increasing service access and on charges for contraceptives and other services. It affects promotional campaigns and the design of media materials.

Throughout this volume, the authors consider the policy implications of research on contraceptive choice. Some might argue against making policy recommendations at present because not enough is known about the factors that influence contraceptive choice or about the most appropriate methods to use for investigating choices. Most of the chapters, however, do deal with policy, explicitly or implicitly. Manipulable policy variables—costs to programs and degrees of access, for example—are considered in many of the analyses.

Whereas policymakers should take individual tendencies into account, individuals also need some awareness that societal consequences of their choices exist, since methods vary in use-effectiveness and continuation rates. We hope, therefore, that the insights provided in this book will be of more than purely scholarly interest.

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Appendix Table 1.1. Regressions for method shares across Asian countries

Predictors	Sterilization		IUD		Pill		Other	
	B	(t)	B	(t)	B	(t)	B	(t)
Year (since 1900)	.075	(2.86)	-.081	(-3.25)	.015	(.46)	.008	(.23)
South Asia (dummy)	.066	(.10)	-2.500	(-5.42)	-.685	(-1.39)	1.397	(2.79)
Southeast Asia (dummy)	-.571	(-1.13)	-1.796	(-5.65)	1.220	(3.54)	.939	(2.79)
Contraceptive prevalence			.036	(3.23)	-.023	(-1.65)	-.036	(-2.77)
Physicians per 1,000 population					-2.704	(-2.79)	3.499	(3.43)
Secondary enrollment ratio	-2.018	(-1.99)					2.864	(2.50)
Newspaper circulation per capita			-7.175	(-6.23)	6.241	(3.84)		
Constant	-5.869		4.711		-1.689		-2.959	
R ² (adjusted)	.26		.71		.53		.70	

Note: The dependent variable in each regression was the logit of the method share, with shares adjusted if needed (for Japan and Hong Kong) to total 100 percent. The first three predictors were forced into the equation; the rest were chosen stepwise, up to a significance level of 0.10. Not entering any equation were proportion urban and proportion of the labor force in agriculture. Raw data on socioeconomic factors are from World Bank files.

PART I
PERSPECTIVES ON
METHOD CHOICE

2 Psychosocial Aspects of Contraceptive Method Choice

by Andrew R. Davidson

Students of family planning frequently observe substantial differences among countries in the relative popularity of various contraceptive methods. For example, the condom is the most widely used method of contraception in Japan, but in the Republic of Korea it is the least used of the modern methods of fertility regulation. In Puerto Rico, female sterilization is much more prevalent than oral contraceptive use, whereas in nearby Jamaica the relative popularity of the two methods is markedly reversed. Such variability in the acceptance and use of specific contraceptive methods is influenced by decisions made at various levels.

At the national and regional level, policies are set concerning the methods to be included and excluded from public and private family planning programs. By national law, sterilization is not permitted, for example, in Burma and Iran. Abortion is illegal in many nations for religious reasons. Injectable contraceptives (e.g., Depo-provera) have been approved by some governments, but their use is not permitted in the United States because of safety concerns.

At the community and clinic level, resources and administrative decisions influence the relative accessibility of particular contraceptive methods. Until recently, the pill was not offered through social marketing arrangements in India and was dispensed only in some rural and urban outlets. In many developing countries a wide range of methods is theoretically available, but a shortage of qualified medical providers (e.g., for menstrual regulation, IUD insertion, and sterilization), in conjunction with supply constraints, limits method availability. The result of these policies and resource limitations is that when a client appears at a family planning clinic, certain methods may be out of stock, others may not be mentioned or may be downplayed by clinic staff, and yet other methods may be available only at more distant supply points (Ainsworth 1984).

Finally, at the individual level, people desiring to avoid or delay an additional birth make decisions about which method of fertility regulation to use. Their decisions obviously are constrained by the policies and decisions made at the national, community, and clinic levels. Yet, it is the sum of the decisions made by individuals and couples that accounts for the national contraceptive prevalence rates presented in the subsequent chapters of this volume. The study of how people choose a method of contracep-

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tion is a recent topic of research which is being investigated primarily by social psychologists and behavioral decision theorists. The theoretical frameworks that guide these investigators and the results of their studies are the focus of the present chapter.

The effort to investigate people's contraceptive decision making has the potential for being a complicated endeavor, not readily yielding to systematic investigation. The potential for complication is due to the diversity among methods of fertility regulation and to differences among potential users in their knowledge, values, and motivations. Fertility-regulating methods vary in such important aspects as efficacy, cost, reversibility, frequency and convenience of use, and potential for side effects. Individuals choosing among methods in many cases make decisions based on limited and incorrect information about important method characteristics, such as the likelihood and type of side effects and correct method use. Moreover, considerable differences exist among the decision makers' motives for using fertility regulation. Many younger couples may be interested in using a contraceptive only to delay a birth. Some couples are unsure about whether they want any children or more children and seek effective protection until such time as they make a decision. Still other couples are strongly motivated to avoid any additional pregnancies. In the face of this diversity among both potential users and contraceptive methods, decision theorists have attempted to develop models of individual decision making that are both general enough to serve as useful summary statements of the decision process and idiosyncratic enough to capture the individual differences in the content and values associated with this process.

THE DECISION-MAKING PROCESS

The task faced by contraceptive decision researchers is to elucidate the process by which an individual who wishes to delay or avoid a pregnancy chooses a contraceptive method from a set of available methods. Although many different frameworks have been proposed to explain the decision process, most theories tend to divide the process into the following stages: identification of consequences, belief judgments, evaluation of consequences, information integration, and choice.

In the first stage, the person making the decision identifies the possible consequences of using the contraceptive method. A woman may believe that the possible consequences of using the pill include protection against pregnancy, convenience of use, and the danger of cancer.

In the belief judgment stage, the decision maker assigns to each of the consequences a likelihood rating according to her or his perception of the probability that the consequence will result from using the contraceptive method. Thus, a woman may believe that the pill will very probably protect her against pregnancy and be convenient to use but that it is extremely unlikely to cause cancer. The identified consequences and belief judgments

may or may not be correct. The accuracy of a person's beliefs tends to be of minor importance to researchers interested only in predicting contraceptive choice because they assume that the person's decisions are determined by what he or she perceives to be true, as opposed to what is actually true. But erroneous beliefs about contraceptive methods are of substantial interest to those providing contraceptive information, education, and services.

In the evaluation stage, the individual assigns to each perceived consequence of using the contraceptive method a value according to its desirability. The woman in the example just given may value the consequence of protection against pregnancy and convenience as very desirable and cancer as extremely undesirable. Although the identified consequences and belief judgments may be correct or incorrect in an objective sense, the evaluation judgments are entirely subjective.

In the information integration stage, the likelihood and evaluation judgments of the consequences associated with the behavior are combined in some manner to form an overall evaluation of the contraceptive method. The hypothetical woman in our example would be likely to evaluate pill use positively because she has assigned highly positive ratings to the two most likely consequences (pregnancy prevention and convenience) and an extremely low probability to the only very negative consequence (cancer).

In the choice stage, the decision maker compares her or his overall evaluation of the available contraceptive alternatives and on that basis selects a method for use.

EXPECTANCY-VALUE MODELS

In the most widely used class of models for predicting contraceptive choice—expectancy-value models—it is assumed that individuals attempt to perform the information integration and choice stages to maximize their potential benefits in relation to costs. A brief overview of the three most popular expectancy-value models is presented here.

The Subjective Expected Utility Model

The subjective expected utility (SEU) model (Edwards 1954; Lee 1971) has its origins in behavioral decision theory. Formal applications of the model have been conducted generally in the context of contrived laboratory settings. Nevertheless, the model has served as the framework for field studies of fertility decision making (see, e.g., Arnold et al. 1975; Beach et al. 1979; Luker 1975).

For the present purposes, each decision maker can be viewed as deciding which contraceptive method to use from a set of alternative methods. The assumption is that decision makers choose the alternative they perceive to have the maximum subjectively expected net value. The SEU model prescribes a way of calculating the net value of each contraceptive alterna-

tive, based on the value of each consequence associated with the particular contraceptive and the subjectively perceived probability that each consequence will occur should that method be used. The model is:

$$SEU_i = \sum_{j=1}^n P_{ij}U_j \quad (1)$$

where SEU_i is the subjective expected utility of choosing contraceptive alternative i , P_{ij} is the subjective probability that use of contraceptive i will lead to consequence j , U_j is the value or utility of consequence j to the decision maker, and n is the number of salient consequences. According to the model, the individual will choose to use the contraceptive method with the highest SEU.

The Rosenberg Model

Equation 1 is very similar to models of attitude formation developed in the social psychological literature. Rosenberg (1956) presented a model specifying the relation between a person's overall evaluation of an object (e.g., a behavior, a policy) and his or her judgments about the value of each consequence associated with the object and also about the instrumentality of the attitude object for achieving or blocking the attainment of each consequence. Algebraically, the model may be expressed as follows:

$$A_i = \sum_{j=1}^n I_{ij}V_j \quad (2)$$

where A_i is the attitude toward using contraceptive i , I_{ij} is the perceived instrumentality of contraceptive i for blocking or attaining consequence j , V_j is the value of consequence j , and n is the number of salient consequences.

Although early applications of the model focused on evaluations of political policy, the model has also been used widely in the study of contraceptive choice (see, e.g., Crawford 1973; Insko et al. 1970; Werner and Middlestadt 1979).

The Fishbein Model

Fishbein and Ajzen (1975) have developed the most frequently cited expectancy-value model of attitude formation. They state that an individual's attitude toward performing a behavior (e.g., using oral contraceptives) is an additive function of his or her beliefs (subjective probabilities) that the action leads to a set of outcomes weighted by the evaluation of those outcomes:

$$A_i = \sum_{j=1}^n b_{ij}e_j \quad (3)$$

where A_i is the attitude toward using contraceptive i , b_{ij} is the belief (subjective probability) that using contraceptive i will lead to consequence j , e_j is the evaluation of consequence j , and n is the number of salient consequences.

The attitude model presented in Equation 3 is one component of a broader theoretical framework designed for the prediction of volitional behavior. According to the theory, an individual's behavior is guided by the intention to perform that behavior. A behavioral intention, in turn, is a function of two factors: attitude toward performing the behavior (as defined in Equation 3) and subjective normative beliefs about what others think the actor should do and the actor's motivation to comply with those beliefs. For present purposes, the theory may be expressed as follows:

$$B_i \sim BI_i = \left[\sum_{j=1}^n b_{ij} e_j \right] w_1 + \left[\sum_{k=1}^m nb_{ik} mc_k \right] w_2 \quad (4)$$

where B is behavior (use or nonuse) with regard to contraceptive i ; BI is the intention to use contraceptive i ; b_{ij} , e_j , and n are as previously defined; nb_{ik} is the person's belief (subjective probability) that individual k thinks she or he should use contraceptive i ; mc_k is the motivation to comply with k ; m is the number of salient referents; and w_1 and w_2 are empirically determined regression weights. Numerous investigations of contraceptive choice have used this theoretical framework (see, e.g., Cohen et al. 1978; Davidson and Jaccard 1979; Davidson et al. 1976; McCarty 1981; Smetana and Adler 1979).

Conceptual Similarities among the Expectancy-Value Models

The expectancy-value models have numerous similarities. First, the SEU component in equation 1 and the A component in Equations 2 and 3 each reflect the overall evaluation of a contraceptive alternative. Second, the subjective probability variable in Equation 1 is directly analogous to the belief variable in Equation 2; both are typically assessed as standard probability judgments with words such as "certainty" or "likelihood" used to prompt the respondents. The concepts of subjective probability and belief are similar, but not identical, to the instrumentality variable in the Rosenberg equation. Instrumentality is generally assessed on a bipolar scale ranging from a minus value (the attainment of the consequence is completely blocked by the behavior) through zero (the behavior is irrelevant to the attainment of the consequence) to a positive value (the consequence is completely attained by the behavior). Finally, the utility, value, and evaluation variables, in Equations 1, 2, and 3, respectively, are analogous and are traditionally measured on bipolar evaluative scales with adjective pairs such as good-bad and desirable-undesirable to prompt the respondents.

The broader Fishbein model, as expressed in Equation 4, appears to be distinct from the other models because it divides the consequences associ-

ated with each contraceptive alternative into two subsets—personal consequences (e.g., I will get cancer) and normative consequences (e.g., my husband will disapprove). The two subsets are hypothesized to combine in a linear weighted manner to determine the behavioral intention to use a particular contraceptive method. Reservations have been raised about the justification for this division when the aim of the research is to test the validity of the overall model (e.g., McClelland 1980). The two primary concerns are that there is inadequate theoretical justification for treating normative beliefs as distinct from other beliefs and that the predictability of the model is artificially enhanced because of the inclusion of two separate regression parameters (one for personal and the other for normative beliefs) estimated from the data. Some recent studies of contraceptive choice using the Fishbein model (e.g., Davidson and Morrison 1983) do not make such a division and, as a result, the form of the model is very similar to that of the other expectancy-value models.

A final similarity among the models is the manner in which they have been operationalized. Each of the models is content-free; a calculus for combining evaluations and beliefs about consequences of using contraceptives is identified, but the specific consequences are not stipulated in the models. Hence, item selection is an important aspect of the operationalization. As discussed by Fishbein and Ajzen (1975), salience has come to be the primary determinant of which beliefs are included in a research investigation, with open-ended interviews used to elicit salient beliefs. For example, an initial sample of respondents might be asked to list the advantages and disadvantages that they associate with the use of particular contraceptive methods. The 10 to 12 most frequently elicited beliefs would be considered the modal salient beliefs for the population and would be included in the final questionnaire.

The identification of salient beliefs is especially important in cross-cultural investigations because, not surprisingly, cultural groups differ in the content of their beliefs about objects and behavior (Fawcett et al. 1974). For example, in a study of beliefs about oral contraceptive use in Mexico and the United States, Davidson et al. (1976) reported that the most frequently mentioned disadvantages differed between countries. Fear of blood clots was salient only in the United States, whereas concerns about nervousness and high blood pressure were frequently mentioned only in Mexico. Accordingly, attempts to operationalize an expectancy-value model in one cultural setting with a list of consequences developed for use in a different cultural setting may result in numerous nonsalient beliefs being included in the questionnaire and important salient beliefs being omitted.

Empirical Tests of the Expectancy-Value Models

Some of the initial studies applying expectancy-value concepts to birth control decisions investigated the beliefs people held about the advantages and

disadvantages of birth control in general. They did not concentrate on specific types of contraceptives and the different characteristics of the methods. Crawford (1973) used Rosenberg's model to examine family planning attitudes and behaviors among 100 black and 100 white, low-income mothers in Chicago, Illinois. His study (and a similar study by Insko et al. 1970) found general support for the model in that respondents who perceived birth control as instrumental in attaining and blocking consequences of import were much more likely than others to have favorable attitudes about birth control, and somewhat more likely to report using a reliable method of birth control. These relationships remained significant even when controls were introduced for the level of education of the respondents. In addition to the substantive findings of this research, the results demonstrate the feasibility of using a decision model among noncollege, low-income populations.

Luker's (1975) research also focuses on general birth control use and represents an application of the SEU model to contraceptive risk taking. On the basis of interviews with women seeking to terminate unwanted pregnancies, Luker observed that women consider the costs and benefits associated with contraceptive use and nonuse. Her work led to an important conclusion, that in many situations unwanted pregnancy may result from a rational decision process in which utilities assigned to contraceptive use are more negative than those assigned to pregnancy, creating a cost-benefit "set" toward risk taking.

More recent studies of contraceptive choice have tended to focus on use versus nonuse of specific methods of contraception. This change has been brought about, in part, by an encouraging line of inquiry in the literature on attitudes and behavior, which has shown that by assessing both attitudes and values at corresponding levels of specificity, a reasonable degree of predictive accuracy can be obtained. Specifically, attitudinal and behavioral variables can be defined by three elements: target, or attitude object (the specific birth control method); action (use or nonuse of the method); and the time at which the action is performed (during a specified time interval). Research has demonstrated that the predictability of contraceptive behavior from expected values or attitudes tends to be very low when the predictor and criterion measures have zero elements in common—alarmingly, a condition that existed in almost half of the attitude-behavior studies that Ajzen and Fishbein (1977) reviewed—and that the strength of the relationship increases significantly with each increase in the degree of correspondence between the elements constituting the variables. For example, in a two-year longitudinal study of married women in the mid-western United States, Davidson and Jaccard (1979) included attitudinal measures that systematically varied in the number of elements they had in correspondence with the behavioral criterion, use of birth control pills during the two-year interval. The resulting pattern of attitude-behavior correlations was as follows: attitude toward birth control, .08; attitude toward

birth control pills, .32; attitude toward using birth control pills, .53; attitude toward using birth control pills during the next two years, .57. For each successive increase in correspondence there was a significant increase in the attitude-behavior correlation.

Many of the expectancy-value studies focusing on specific methods of contraception have investigated use of oral contraceptives. For example, in a study of college students in the United States, Werner and Middlestadt (1979) reported a correlation of .55 between the expected value of oral contraceptive use and its actual use. Similarly, in their 1979 study of midwestern U.S. married women, Davidson and Jaccard observed a correlation of .61 between the components of the Fishbein expectancy-value model, as measured at the start of a two-year interval, and actual oral contraceptive use during the interval. The model's ability to predict contraceptive behavior did not vary with the educational level of the respondents. In both the Davidson and Jaccard and the Werner and Middlestadt studies, respondents choosing to use the pill thought it less likely that the pill would lead to health risks, including blood clotting and unnatural changes in body chemistry, and more likely to lead to the positive side effects of increased sexual pleasure and regulation of the menstrual cycle than did women not intending to use the pill.

Davidson et al. (1976) investigated the decision to use oral contraceptives in a survey of two contrasting samples of women residing in Mexico City, a college-educated sample and a sample of women with less than four years of education. The correlation between the expectancy-value model and intention to use oral contraceptives was .85 for the college-educated sample and .61 for the lower-class sample. The difference in the validity of the model for the two samples was attributed primarily to the differences in the reliability of measures between samples; the test-retest reliability of the measures was higher for the college sample. An interesting finding from this research was that the relative influence of certain categories of beliefs varied as a function of the sample. Normative beliefs (e.g., what the respondent perceived her mother-in-law and her husband to expect) were far more important in guiding contraceptive decisions for the lower-class sample than for the college-educated sample. More generally, the results of this study, in conjunction with the findings of Crawford (1973) and Davidson and Jaccard (1979), suggest that the expectancy-value model can be useful in studies of contraceptive choice among a wide range of respondents.

Although expectancy-value models have frequently demonstrated substantial predictive validity, some theorists (e.g., Adler 1979; Jaccard 1981; McClelland 1980) have begun to point to an important inconsistency between choice theory and the manner in which expectancy-value models have been tested in the contraceptive and fertility literature. According to

the expectancy-value model, choice is based on the relative expected values among behavioral options, and not on the expected value of just one option. Traditionally, the expected value of only the target behavior (e.g., using oral contraceptives) has been assessed for each member of the sample, and those with the highest expected value have been judged most likely to choose the target behavior. This approach can lead to prediction errors. For example, respondent A's expected value of using birth control pills is moderately negative and yet she still chooses pills because she has extremely negative views of her alternative choices, whereas respondent B has quite positive views about pill use and yet does not choose pills because she values one of her alternatives (e.g., diaphragm use) even more positively. In response to this problem, recent studies (Davidson and Morrison 1983; Pagel and Davidson 1984) have demonstrated that for contraceptive choice, a within-subjects approach to prediction, based on the relative values among a set of alternatives, provides substantially more accurate predictions of contraceptive behavior, than does the more traditional across-subjects procedure, based solely on the expected value of the target behavior.

The evidence reviewed here points to the usefulness of the expectancy-value framework for studying contraceptive method choice. These explicit models of decision making have prompted a substantial body of research examining the validity and boundary conditions of choice theory. The studies have yielded findings of substantive interest and have frequently demonstrated notable levels of predictive accuracy. Part of the attractiveness of this perspective for empirical work has been the simplifying assumption that one model can account for the contraceptive choices of all respondents. The inherent limitation of this assumption has led other theorists to posit the competing models of contraceptive choice to which we now turn.

ALTERNATIVE MODELS OF CONTRACEPTIVE METHOD CHOICE

Several decision models have been proposed that differ from the expectancy-value model in two key stages of the decision process: information integration and choice. Focusing first on choice, Simon (1957) has argued that it is incorrect to assume that respondents compare their overall evaluations of all relevant alternatives before making a choice. Rather, respondents select the first alternative that receives a satisfactory overall evaluation (one that is above some theoretical comparison level), even though that alternative might not be the most preferred if the full set of alternatives were evaluated. This model has much intuitive appeal. It is quite possible, for example, to imagine a client in an information-poor environment accepting the first satisfactory method of contraception offered by a family planning field worker. Despite the plausibility of Simon's argument,

it has not been applied to the study of contraceptive choice and has only rarely been explicitly tested in other contexts. One limitation has been the difficulty of assessing the appropriate comparison level.

Models of information integration, different from the information integration presented in the expectancy-value framework, have also been proposed. According to expectancy-value theory, the desirability of each consequence is multiplied by the subjective probability that the consequence will occur and the resulting products are summed. The product terms associated with each consequence are given equal weights and, for example, an adequate number of moderately good consequences can compensate for a very negative consequence. However, various studies have begun to suggest that the equal-weighting assumption is not completely correct and that negative consequences tend to be more important than positive consequences in determining choice. Jaccard and Becker (1987), in a carefully controlled laboratory experiment of attitudes toward hypothetical methods of contraception, found that very negative consequences (e.g., health risks) are more important than positive consequences in determining contraceptive preferences. Yet, even in their study the equal-weighting assumption of the expectancy-value model accounted for most of the variance in attitude judgments (86 percent), and the inclusion of larger weights for negative consequences led to only a small increase (from 86 percent to 92 percent) in explained variance.

Perhaps the most extreme form of the unequal-weighting assumption can be found in the "elimination by aspects" model of Tversky (1972). According to this sequential decision model, available methods of birth control are first compared with regard to the aspect (safety, cost, etc.) that is most important to the respondent. Any method that fails to reach some satisfactory level on this aspect is eliminated from further consideration, regardless of other characteristics of the method. The remaining methods are then evaluated on the second most important dimension, with unsatisfactory alternatives eliminated. The sequential procedure continues until only one alternative remains. This model appears to be applicable to many instances of contraceptive choice. For example, couples who are choosing a contraceptive method solely for the purpose of delaying their next birth would probably eliminate sterilization from consideration on the basis of only one characteristic, irreversibility. Although the elimination-by-aspects model seems to provide a valuable heuristic, to date it has received little attention in the literature on contraceptive choice.

As the above discussion suggests, a large number of possible rules exist for integrating information. The simplifying assumption of expectancy-value theory, that all respondents in all situations use the same strategy for information integration, is, without doubt, incorrect. Some investiga-

tors (e.g., Jaccard and Becker 1987; Nickerson et al. 1983) have begun the painstaking process of identifying and precisely testing alternative integration rules. Future advances in the understanding of contraceptive choice probably will result from these endeavors.

FROM DECISIONS TO ACTIONS

The theoretical frameworks that have been reviewed here are designed primarily for the prediction of a contraceptive choice. Choice can be operationalized either as an intention to use a particular method at some future time or as a behavior—the actual use of a method. Not surprisingly, models of contraceptive choice are better at predicting what people plan to do than what they actually do. In this behavioral domain, as in every other, the best of intentions often do not result in behavior. Models of individual decision making have not adequately specified the conditions under which intentions represent accurate predictions of behavior. However, a number of studies have begun to highlight some important variables.

Although most choice models attempt to elucidate the process by which *individuals* make decisions, contraceptive behavior affects both sexual partners. A husband may decide that he and his wife will rely on oral contraceptives, but if the wife refuses to use the pill the man's decision will not be translated into behavior. It is notable that so much of the research on contraceptive choice has focused solely on female decision making. The couple is treated as a single entity (for which the female is the spokesperson) rather than as two interacting persons with possibly conflicting views about contraceptive methods. The importance of investigating the beliefs and values of both partners is just beginning to be recognized. Severy (1984b) has outlined important differences between married partners in both their perceptions of the consequences of available methods of contraception and their most preferred methods of contraception. Beckman et al. (1983) have developed a detailed model of the process by which the values of husbands and wives relate to the contraceptive use of the couple.

In addition to obtaining the cooperation of one's spouse, the actual use of a contraceptive method is frequently dependent upon the successful completion of a series of prior events. For example, for a woman in the United States to receive a sterilization procedure in a public medical facility, she must first attend an initial sterilization counseling session at least 30 days prior to the procedure, sign a consent form to be sterilized, pass a physical examination, have a meeting with a social worker if the physician believes such a meeting would be advisable, obtain the physician's consent to have the procedure, and schedule the procedure. Although some of the steps in the sequence are under the woman's control, others are not. In preliminary studies at Columbia-Presbyterian Medical Center, we have found that

from 30 percent to 40 percent of women signing the sterilization consent form, and thereby indicating an intention to be sterilized, fail to complete the sequence and have the procedure.

Some women change their minds about sterilization because of new information they receive during the sequence, but many others simply become discouraged by the delays and required number of appointments. For many women in the latter category, not completing the sterilization sequence results in an unwanted pregnancy. For other populations and methods of contraception, the number of requirements for obtaining contraception may not be so extreme. Still, inaccessibility of methods and services can discourage even those with a strong intention to use a contraceptive method. In an interesting cross-cultural study, Kar and Cumberland (1984) have demonstrated that, over and above the attitudinal and belief components of the Fishbein model, the perceived accessibility of contraceptive methods is an important determinant of contraceptive use in Kenya and Venezuela.

As the above discussion suggests, the prediction of contraceptive behavior from stated choice yields a very biased error pattern (Davidson and Beach 1981). Many more errors in prediction are of the false-positive type (contraceptive use intended but contraceptive not used) than are of the false-negative type (contraceptive use not intended but contraceptive used). The problems of inaccessibility and lack of social support from spouse and relevant others contribute to this error pattern, but certain client characteristics also play a role. One factor, of interest because it is susceptible to change through educational efforts, is the amount of information available to prospective contraceptive users about the decision alternatives. Decisions that are buttressed by substantial amounts of information are more predictive of subsequent behavior than are decisions lacking such informational support (Davidson et al. 1985).

POLICY RELEVANCE OF RESEARCH ON CONTRACEPTIVE CHOICE

Much psychosocial research on contraceptive choice points to two procedures for influencing the choices of individuals. One approach is to enhance the information available to clients and potential clients of family planning services; the other is to modify contraceptive methods and service delivery systems. All of the decision models reviewed here assume that individuals' contraceptive choices (including the choice to use no method) are guided by their belief systems about the consequences of using the methods. Their belief systems often contain inaccurate and incomplete information. Many women reject oral contraceptives because they incorrectly believe that oral contraceptives will enhance their risk of cancer. Similarly, many women reject tubal sterilization because of their incorrect belief that it will interfere with their menstrual pattern. Decision models

provide useful tools for uncovering inaccurate beliefs and for learning about the importance of those beliefs in determining contraceptive method choice.

Incorrect beliefs that are also important determinants of choice serve as excellent candidates for attention in contraceptive education and counseling efforts. In addition, decision studies can identify whether the husband or the wife has the most influence on the decision process. The primary decision maker can then become the target for communication efforts. An illustration of how contraceptive decision research can serve as the basis for effective informational messages can be found in McCarty (1981).

One outcome of studies of contraceptive choice is the identification of the most desirable and undesirable consequences and attributes associated with contraceptive methods. Such information has the potential for resulting in a more rational approach to the design of new contraceptives. Several agencies funding the development of new and improved methods of contraception—most notably the Human Reproduction Unit of the World Health Organization—have taken the perspective that biological scientists should be guided in their investigation of biomedical feasibility by considerations of what is socially acceptable. As Marshall (1977) has argued, rather than being reactive to the efforts of biomedical scientists and family planning program administrators (i.e., concentrating research efforts on how best to motivate people to use existing methods of contraception), social scientists should be proactive; that is, they should conduct research that can be used to guide the design of new and more acceptable fertility regulating methods and delivery systems. Research that has this objective is commonly referred to as acceptability research. Most acceptability research has focused on the role of specific contraceptive attributes (e.g., route of administration, side effects) in determining the acceptability of overall methods (Marshall 1977). Thus, acceptability research can be viewed as a special application of research to contraceptive decision making. Decision models can provide a useful heuristic for the study of important contraceptive attributes that are socially acceptable.

3 Physicians' Perceptions of Contraceptive Methods: Cultural Comparisons

by Lawrence J. Severy

Contraceptive choice has many determinants. There is a vast difference between a situation wherein individuals have perfect freedom to choose from among a variety of family planning methods and one wherein a particular family planning program or government policy dictates the particular method to be used by couples. The area between these two extremes is populated by most of us. Consider, for example, how accessibility to family planning programs and availability of contraceptive methods influence the choice and use of such programs and methods (see, e.g., Cornelius and Novak 1983). Psychologists would argue that actual availability (which might be measured in geographic, political, or economic terms) may be less important than psychological availability. To the psychologist, perception is reality. What the potential consumer believes to be available is, in fact, what is available for that individual.

One critical influence on choice of family planning method is the physician. What a potential consumer believes to be true about contraceptive alternatives often depends upon information provided by the physician. Not only is the physician able to provide family planning information and services, he or she is often an influential leader in the community, thus having an effect on public policy and health service delivery systems. Moreover, the physician is a potential contraceptive user and decision maker. Given this central role, it seems important to take a closer look at physicians' perceptions of various contraceptive methods.

A pilot study of physicians' perceptions of contraceptive methods, conducted in four developing countries in 1985, provides the grist for this chapter. My colleagues and I were guided, first, by a desire to assess a full complex of contraceptive methods and physicians' responses to those methods; consequently, we included both modern methods and natural family planning methods in our investigation. Second, we were interested in a cross-cultural assessment because we knew that physicians might play different roles in various cultures. As contraceptive method choice also varies by culture, disentangling the relationships between physicians' roles and method choice seemed an interesting possibility. This chapter, which discusses only one aspect of our study, focuses on cultural differences in

physicians' perceptions of contraceptive methods and the effects of those perceptions on physicians' behavior.

THEORETICAL ISSUES

Before addressing the motivational issues, it is useful to consider contraceptive method perceptions per se. A rare study of this subject is Callan and Gallois's (1984) multidimensional scaling analysis of the similarities and differences among 17 methods of contraception. Two important dimensions for similarity judgments they found were natural versus nonnatural methods and a dimension related to effectiveness, cost, and safety. Unfortunately, their sample was small, consisting of fewer than 100 university undergraduates. Other approaches, particularly qualitative, have been employed to generate lists of the salient attributes of contraceptives (e.g., Marshall 1977; Severy 1982). None of these investigations, however, has concentrated upon physicians' perceptions.

It is important to delineate individuals' perceptions regarding contraceptive alternatives. For several years, marketing and advertising researchers have been generating multidimensional space representations of individuals' perceptions of products (Moore and Holbrook 1982; Holbrook et al. 1982). The term marketers use to identify groups of individuals who may have different perceptions, values, and goals is market segmentation. Marketers attempt to discover the ideal characteristics of their products for the various market segments and then devise advertising that will lead individuals in a given segment to select those products. In a similar fashion, our project has attempted to delineate, in a multidimensional framework, the attributes that physicians in various developing countries associate with particular contraceptive methods.

An individual's perceptions of various products or courses of action have critical importance to theories of motivated behavior and motivated (deliberate) choice. According to a theory of discrepancy, individuals are thought to value certain end states, against which they compare their current perceptions of their own lives. For example, to construct a value-access disjunction model of juvenile delinquency, a psychologist may ask a youth how important family relationships are to him. He then asks the youth how well his family gets along and how well the youth fits in with the family. If the youth believes that things are going well in the family, there is no disjunction (no discrepancy) and no motivation to alter the current state of affairs. If, however, the youth is not doing well, then a discrepancy exists and motivation equivalent to this discrepancy drives the youth to try to rectify the situation.

In the area of contraceptive choice, if a couple associates a desired process or feeling with an ideal contraceptive method, and if the method the couple is using matches well with that desired end state, they have little moti-

vation to change from one method to another. Alternatively, if they perceive their method to be seriously discrepant from the desired state of affairs, then they are motivated to consider alternatives. Two perceptions are relevant here: the perception of the ideal (the desired end state) and the perception of the current state of affairs. The belief that grass is greener on the other side of the fence probably results from misperceptions of both pastures.

An extension of this approach involves consideration and comparison of alternatives. Theoretically, the work of Thibaut and Kelley (1959; Kelley and Thibaut 1978) exemplifies the role of alternatives in their formulations of comparison level and comparison level for alternatives. A particular choice is determined in part by the size of the discrepancy between alternatives. Earlier work on contraceptive choice (e.g., Severy 1982, 1985) demonstrates that avoiding negative alternatives is as important as enjoying the positive characteristics of the method chosen. Only by observing along which dimensions, and how greatly, the unchosen alternatives differ from the chosen alternative can one really understand the reason for the choice that a physician (or couple) makes.

A second common approach in studies of population phenomena involves two perceptual constructs. Subjective expected utility (SEU) models and expectancy-value models depend upon the beliefs that individuals have about various choices and how they prioritize the attributes they associate with the choices. SEU and expectancy-value models have been employed in studies of fertility intentions (Insko et al. 1970; Davidson and Jaccard 1975; Townes et al. 1977), contraceptive choice (Cohen et al. 1978; Severy 1982), migration (Chemers et al. 1978), abortion (Smetana and Adler 1979), and breastfeeding (Manstead et al. 1983). In each of these studies, respondents were asked to delineate their perceptions of the characteristics of the alternatives as just one aspect of the choice process.

In both theoretical approaches, an individual's perceptions regarding the characteristics of the chosen method are at the core of the issue. In this sense they resemble a Gibsonian perception, according to which, when people view the world, an important process that occurs is that they formulate an opinion about what each perceived object affords them (Gibson 1966). Each type of model also depends upon a construct that reflects an individual's ratings of the importance of attributes. In other words, a first critical construct includes the perception of existent characteristics, and a second construct considers the relative importance of the characteristics. Consequently, the individual's perceptions are central to what he desires, what he is currently using, and also what his alternatives are. The attempt to define physicians' perceptions of contraceptive alternatives should lead to an understanding of the link between those perceptions and service provision of contraceptive alternatives.

METHODOLOGY

The investigation involved a team of researchers from six countries, who collected data in four developing countries: Mauritius, Peru, the Philippines, and Sri Lanka. Those countries were chosen because of the extensive use there of natural family planning methods. Along with Haiti and the Republic of Korea, for example, they show higher than average use of periodic abstinence (Bulatao 1985b:1). As Bulatao notes, Peru and the Philippines are predominantly Catholic, whereas Sri Lanka and Mauritius are not. The four countries represent quite different regions of the world—South America, Southeastern Africa, South Asia, and Southeast Asia.

The larger study was designed by Robert Snowden of the Institute of Population Studies, University of Exeter, in Devonshire, England, and myself. The predominant focus of the investigation was upon natural family planning methods and the promotion of such methods by physicians. We also considered alternative methods to avoid a bias toward specific methods. After the project was approved for funding, we recruited and hired principal investigators in each of the four countries. The principal investigators and other members of the research team arranged for data from pilot focus-group interviews to be collected in the four countries prior to a workshop in February 1985 in England. The data were used to develop a protocol for use in all four countries, to assess physicians' knowledge, perceptions, attitudes, and behavioral willingness regarding a variety of family planning methods, including natural methods.

Sample

Using the protocol, we collected data from a total of 375 physicians in the four countries: 70 in Mauritius, 105 in Peru; and 100 each in the Philippines and Sri Lanka. All physicians involved in family planning in Mauritius were included, whereas physicians in Sri Lanka and the Philippines were geographically stratified prior to randomized selection. In Peru, deliberate random sampling from the Lima area included OB/GYNs, clinicians, and general practitioners.

One hundred and fifty of the physicians in the sample, or 28 percent, were less than 40 years of age. Mauritian and Philippine physicians were generally younger than those from Peru (mean ages were 42.6, 42.6, and 47.0, respectively), and the difference had statistical significance. (The Sri Lankan average age of 46.1 fell between these two extremes.) We found no relationship between physicians' age and whether or not they provided information to patients about natural family planning methods.

One hundred and twenty-three, or 33 percent, of the physicians were women. Interestingly, the physicians' gender was significantly correlated with the willingness measure, women being more likely than men to provide information on natural methods.

As for medical specialities, 156 physicians were general practitioners, 130 were clinicians, and 89 were OB/GYNs. Thus, they were not equally knowledgeable about the contraceptive methods they were asked to describe. Medical speciality was also related to willingness to provide information about natural methods, 54 percent of general practitioners, 46 percent of OB/GYNs, and only 36 percent of the clinicians reporting that they were so willing.

The degree to which religion influenced the physicians' willingness to provide information about natural methods varied by country. The least influence was reported in Sri Lanka and Mauritius, the greatest in the Philippines; religious influence was intermediate in Peru.

Measures

The results are based upon three types of measures employed in the protocol. First, drawing upon data from the preliminary focus-group interviews and from prior literature (e.g., Marshall 1977; Severy 1982), we prepared a list of characteristic attributes that were presented in semantic differential format for rating by the physicians. The physicians were asked to rate the pill, calendar, temperature, and Billings¹ methods of family planning, using a series of bipolar adjectives. On the basis of preliminary factor analyses of these dimensions, we developed nine scales with scores ranging from 1 to 7 for each: the amount of health risk involved in using a method, the financial cost of the method, the degree to which the method conflicted with cultural norms, the amount of knowledge of human physiology required by the patient to use the method, how certain the patient could be that the method would be effective as well as how easy it was to use, the number of actions that the method required of the physician, the number of actions that the method required of the patient, the effect of the method on the partners' relationship, and whether the method was thought to be "good," "scientific," and useful.

In addition, we sought two general assessments of family planning methods. In preliminary discussions, many physicians mentioned the natural versus artificial nature of various methods (a similar distinction was reported by Callan and Gallois 1984) and whether the methods were "modern" or "traditional." We therefore asked respondents to rate 16 contraceptive methods on these two measures, using three-point scales.

Last, the protocol included several measures to assess physicians' willingness to provide information and services, recommend methods to their patients, or seek training and information regarding the pill, calendar, tem-

1. The Billings, or ovulation, method is a method of periodic abstinence based on changing patterns of cervical-mucus secretions which a woman monitors by self-examination (Betts 1984; Liskin 1981).

perature, and Billings methods of family planning. The measures of willingness involved simple dichotomous responses to each potential behavior. Of special importance to our analysis was a five-point scale ranging from "strongly agree" to "strongly disagree," which we used to measure whether physicians wanted their patients who came to them for family planning advice to use the method.

RESULTS

Our analysis of the data focused on four areas of interest: first, the physicians' perceptions of various contraceptive methods; second, relationships among types of methods; third, basic data on prevalence and acceptance rates for natural and other family planning methods; and fourth, the relationship between physicians' perceptions of a method and their recommendation that a patient use or not use it.

Physicians' Perceptions of Contraceptive Methods

The perceived modernity of the 16 family planning methods ranged from 1.06 for withdrawal to a high of 2.80 for vasectomy on a scale from 1 to 3 (Table 3.1). Statistically significant differences among the four countries occurred for 13 methods. Only the sympto-thermal method, Billings method, and breastfeeding received consistent responses from the physicians in the four countries.

Table 3.2 presents a similar delineation with regard to natural versus artificial methods of contraception. Scores for artificiality ranged from a low of 1.11 for calendar-rhythm to a high of 2.93 for the IUD. Ten of the methods generated statistically significant differences among physicians from the four countries. Interestingly, among those methods not generating national differences were the pill, withdrawal, sympto-thermal, and the diaphragm.

Interestingly too, Peruvian physicians tended to rate all methods as more traditional than did physicians in the other countries, and physicians from Sri Lanka and the Philippines tended to rate the various methods as more artificial than did physicians from Mauritius and Peru.

The entire sample's perceptions of the relative modernity and artificiality of the 16 methods are plotted in Figure 3.1. This representation of a two-dimensional space does not imply that dimensions are orthogonal; rather, it is intended to assist the reader in distinguishing among methods on the two dimensions. In the upper right-hand corner are clustered eight methods that are all judged to be artificial. As they progress from the left to the right (i.e., from the condom to vasectomy), they are perceived as being less traditional and more modern. This sequence reflects the historical order in which these methods were introduced. The four vectors leading to the pill, Billings, temperature, and calendar-rhythm methods of contraception identify the four methods receiving further attention in this cross-cultural

Table 3.1. Physicians' perceptions of the modernity of specific family planning methods, by country: Mauritius, Peru, Philippines, and Sri Lanka

Method	Overall mean	Mauritius	Peru	Philippines	Sri Lanka	F	3/df	P
Pill	2.59	2.44	2.36	2.69	2.82	7.54	371	.0001
IUD	2.69	2.56	2.59	2.77	2.79	2.67	371	.0473
Calendar	1.30	1.36	1.11	1.56	1.21	8.44	368	.00001
Condom	1.87	1.64	1.17	2.33	2.32	47.72	369	.00001
Injectable/Depo	2.74	2.66	2.54	2.98	2.74	8.46	370	.00001
Withdrawal	1.06	1.09	1.00	1.12	1.04	2.71	369	.0452
Temperature (BBT)	1.99	1.87	1.82	2.25	2.00	4.08	368	.0072
Spermicidal foam, jelly	2.45	2.31	2.08	2.67	2.70	13.40	371	.00001
Diaphragm	2.25	1.90	1.82	2.63	2.55	23.45	369	.00001
Vasectomy	2.80	2.86	2.50	2.93	2.94	14.66	371	.00001
Female sterilization	2.68	2.79	2.18	2.89	2.92	29.70	371	.00001
Douche	1.49	1.39	1.10	1.59	1.89	20.16	369	.00001
Herbal methods	1.27	1.27	1.11	1.33	1.38	5.58	366	.0009
Sympto-thermal	2.14	2.12	2.04	2.11	2.25	1.39	341	NS
Billings	2.35	2.33	2.28	2.34	2.45	.74	364	NS
Breastfeeding	1.15	1.20	1.16	1.22	1.05	2.47	360	NS

Note: Scores for perceptions of modernity range from 1 (traditional) to 3 (modern). Tests of significance reflect one-way analyses of variance. BBT—basal body temperature.

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Table 3.2. Physicians' perceptions of the artificiality of specific family planning methods, by country: Mauritius, Peru, Philippines, and Sri Lanka

Method	Overall mean	Mauritius	Peru	Philippines	Sri Lanka	F	3/df	P
Pill	2.88	2.83	2.89	2.96	2.83	1.66	371	NS
IUD	2.93	2.77	2.97	2.97	2.95	5.64	371	.0009
Calendar	1.11	1.20	1.06	1.17	1.04	2.88	370	.0359
Condom	2.82	2.66	2.74	2.91	2.91	4.60	371	.0036
Injectable/Depo	2.90	2.86	2.88	2.92	2.92	.45	371	NS
Withdrawal	1.28	1.30	1.16	1.29	1.37	1.85	369	NS
Temperature (BBT)	1.25	1.23	1.13	1.47	1.18	5.78	367	.0007
Spermicidal foam, jelly	2.87	2.80	2.84	2.88	2.93	1.19	371	NS
Diaphragm	2.87	2.80	2.83	2.91	2.92	1.41	369	NS
Vasectomy	2.79	2.64	2.63	2.96	2.89	8.97	371	.00001
Female sterilization	2.79	2.64	2.65	2.96	2.89	8.42	370	.00001
Douche	2.29	2.29	2.07	2.38	2.44	3.34	369	.0195
Herbal methods	2.13	2.21	1.96	2.26	2.11	2.26	367	NS
Sympto-thermal	1.74	1.84	1.78	1.81	1.56	2.94	341	.0331
Billings	1.42	1.60	1.29	1.48	1.36	2.83	365	.0383
Breastfeeding	1.13	1.26	1.15	1.15	1.02	3.98	361	.0083

Note: Scores for perceptions of artificiality range from 1 (natural) to 3 (artificial). Tests of significance reflect one-way analyses of variance. BBT—basal body temperature.

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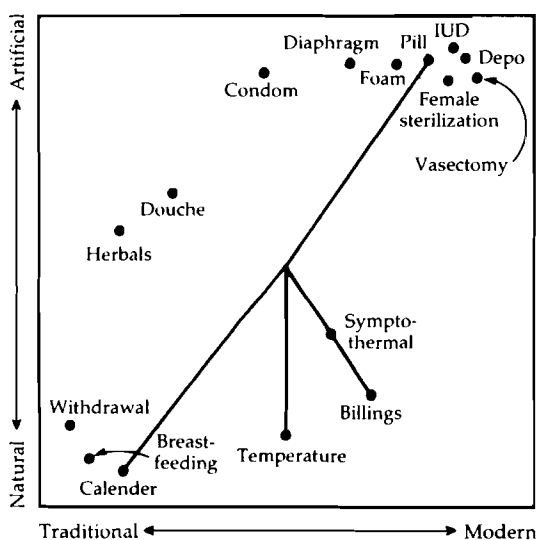


Figure 3.1. Physicians' perceptions of the artificiality and modernity of 16 contraceptive methods

investigation. Those methods represent three of the four quadrants in this two-dimensional space. Only traditional-artificial methods (herbals and the douche) were not intensively investigated. It is noteworthy that, among natural methods, the Billings method was thought to be the most modern.

There was considerable variation by country in the semantic differential perceptions of the four methods, to which we next turned our attention (Table 3.3). Seven of the nine factor-analytic scales described earlier evinced statistically significant differences for the pill, calendar, and temperature methods. As regards Billings, only five scales generated such differences by country. These scales can be used to generate spatial depictions for illustrative purposes. Differences among countries are particularly interesting. Figure 3.2 presents the findings for two methods, calendar-rhythm and the pill, on a two-dimensional space with one axis depicting "bad" and unscientific versus "good" and scientific and the other axis the degree of strain or ease on a relationship associated with each method. Physicians in all four countries thought the calendar-rhythm method was good and scientific but strained a relationship, whereas they thought the pill was not only better on the good and scientific dimension but also easy on the partners' relationship. Philippine physicians were most likely to say that the calendar-rhythm method strained a relationship while the pill was easy on a relationship, whereas Peruvian physicians were the least likely to say that calendar-rhythm or the pill affected the relationship either positively or negatively.

Table 3.3. Representative method characteristics reflecting a cross-cultural main effect: Mauritius, Peru, Philippines, and Sri Lanka

Characteristic	Mau-ritius	Peru	Philip-pines	Sri Lanka	<i>F(df)</i>	<i>p</i>
Method's ease on relationships						
Pill	5.73	5.02	6.21	5.86	$F(3,311) = 9.72, p < .0001$	
Calendar	3.20	3.62	2.16	3.71	$F(3,304) = 18.34, p < .0001$	
Temperature	3.27	3.55	2.31	3.76	$F(3,304) = 15.99, p < .0001$	
Billings	3.03	3.73	2.61	3.90	$F(3,237) = 10.62, p < .0001$	
Knowledge of bodily functions required of patient						
Pill	5.48	5.68	3.71	5.23	$F(3,338) = 11.42, p < .0001$	
Calendar	2.19	3.07	3.10	2.64	$F(3,337) = 3.59, p < .02$	
Temperature	1.81	2.81	2.39	2.45	$F(3,334) = 4.08, p < .01$	
Billings	1.66	2.36	2.24	2.31	$F(3,277) = 7.31, p < .05$	
Cost						
Pill	4.95	2.06	2.08	3.99	$F(3,338) = 43.57, p < .0001$	
Calendar	6.90	6.42	6.86	6.71	$F(3,337) = 3.17, p < .03$	
Billings	6.69	5.74	6.71	6.50	$F(3,277) = 7.31, p < .0001$	
Consistency with religious and social norms						
Pill	3.56	2.13	1.06	2.67	$F(3,338) = 26.35, p < .0001$	
Calendar	6.63	6.59	6.83	6.20	$F(3,337) = 2.96, p < .04$	
Billings	6.51	6.28	6.72	6.07	$F(3,277) = 2.80, p < .04$	
Good, scientific, useful characteristics						
Calendar	5.04	5.08	5.81	4.68	$F(3,304) = 11.28, p < .0001$	
Temperature	5.56	4.90	5.73	4.82	$F(3,304) = 11.35, p < .0001$	
Billings	5.34	4.94	5.89	4.77	$F(3,237) = 12.70, p < .0001$	
Certain and easy characteristics						
Pill	6.36	6.51	6.69	6.01	$F(3,311) = 15.25, p < .0001$	
Calendar	2.99	3.78	2.83	3.09	$F(3,304) = 8.80, p < .0001$	
Temperature	2.94	2.99	2.41	2.76	$F(3,304) = 3.98, p < .01$	

Note: Scores for items, which represent physicians' perceptions, range from 1 to 7. Tests of significance reflect one-way analyses of variance.

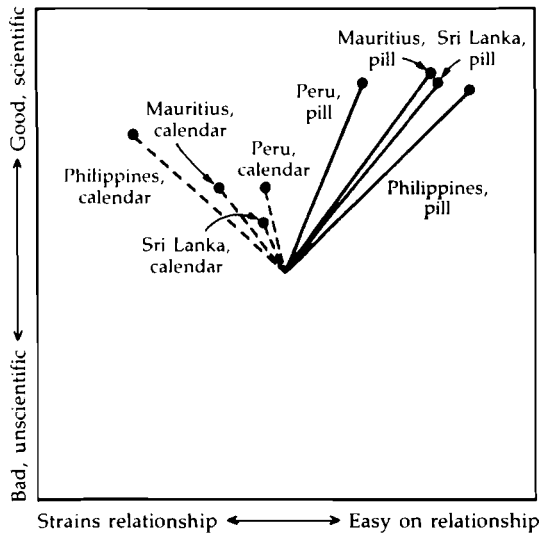


Figure 3.2. Physicians' perceptions of the pill and calendar methods, by country: Mauritius, Peru, the Philippines, and Sri Lanka

Note: The vertical axis depicts the continuum of "bad, unscientific" to "good, scientific," whereas the horizontal axis ranges from "strains partners' relationship" to "is easy on partners' relationship."

Patterns of Method Attributes among and within Countries

Although the analyses of variance results discussed thus far paint a stable picture of the influence of the four countries on the perceived characteristics of various methods, there remain several unresolved issues for which a correlational procedure may prove helpful. The analysis of variance results is based upon the absolute value (mean scores) of the ratings rather than on the relative priority of scores. Although physicians in one country may rate the pill as being more costly and scientific than do physicians in another country, physicians in both countries may still consider the two attributes to be most characteristic of the pill. The question here, then, is whether the pattern of perceived attributes, when ordered from the most characteristic to the least characteristic attribute by physicians in one country, is similar to the pattern ordered by physicians in the other countries.

Perceptions of the pill can be classified into six possible paired comparisons, given that four countries are involved. Correlations can be derived from the mean value for each of the ratings of the characteristics of the method. For the pill, these correlations ranged from .79 to .96, with an average (Z score transformation) of .89. This finding indicates an extremely high level of agreement among physicians in the four countries about the attributes of the pill. The lowest agreement was between physicians in Mauritius

and the Philippines. The highest agreement was between physicians in Mauritius and Sri Lanka.

A similar analysis performed on the Billings method produced correlations ranging from .96 to .98 and an even higher agreement about the characteristics of this form of family planning. When we compared ratings of the attributes of the calendar method, we obtained correlations ranging from .93 to .99. The temperature method generated correlations ranging from .95 to 1.00, with a mean of .98.

Even though quantitative differences among countries emerged from the correlational analysis, the amount of agreement in the pattern of characteristics attributed to the pill was strikingly consistent. We found correlations to be highly statistically significant; in fact, all four of the average correlations were statistically significant at p of less than .001.

A second way of utilizing this correlational approach is to analyze the pattern of perceived attributes by country and note whether physicians in a given country make distinctions among the various methods. We expected the physicians in all four countries to differentiate the pill from the natural family planning methods, but we were not sure whether they would make meaningful distinctions among the three natural methods. We were interested in learning whether physicians really perceive differences in the attributes of the three natural methods or whether they tend to regard them as essentially similar.

In Mauritius the correlations between the pill and the natural methods were negative and moderately large, but they only approached statistical significance. The average correlation of the pill with the natural methods was $-.55$, suggesting that, although physicians in Mauritius tended to regard the pill as very different from the three natural methods, the distinction had no statistical significance. Conversely, in Mauritius and also in Sri Lanka, physicians tended to regard the Billings, calendar, and temperature methods as extremely similar, the average correlation being .99 for the three possible comparisons of these natural methods.

The situation was slightly different for Peru and the Philippines. The average intercorrelation between the pill and the natural methods was $-.83$ in Peru and $-.70$ in the Philippines. These values are statistically significant and suggest that physicians in those two countries attribute to the pill characteristics opposite to those of the natural methods. The highest negative correlation in Peru, at $-.85$, was between the pill and the calendar method; similarly, in the Philippines it was $-.73$.

Provision of Family Planning Services

We were interested in knowing which methods the physicians in our sample relied upon most in meeting their patients' needs for family planning. For 46 percent of the total sample, the pill was the preferred method (that is, the method they most often dispensed or prescribed). The IUD was sec-

ond in popularity, preferred by 21 percent of the sample. The other preferred methods were female sterilization (12 percent), the injectable Depo-provera (9 percent), and the calendar method (7 percent).

A related analysis suggested differences among the four countries in physicians' willingness to provide information about natural methods. On a scale from 0 to 1, with 0 indicating no willingness and a 1 indicating willingness to provide such information, physicians in the Philippines registered the greatest willingness, at .66. The means for Mauritius, Peru, and Sri Lanka were, respectively, .26, .37, and .49, and the differences between these scores and that for the Philippines were statistically significant. The differences between the scores for Mauritius and Sri Lanka were also significant.

We were interested in knowing which methods physicians in all four countries agreed upon recommending. More than one-third (139 of the 375 physicians) were unwilling to recommend either the pill or the three natural family planning methods (calendar, Billings, and temperature). Only 51 physicians were willing to recommend or provide services for all four methods. Eighty-seven physicians were willing to prescribe or provide only the pill. Only 24 physicians were willing to recommend all three natural family planning methods. Last, 74 physicians were willing to recommend the pill and at least one natural method. Thus, more than one-third of the physicians were willing to recommend more than one method.

It is possible to cross-classify by country these five delivery service patterns (none of the methods, all of the methods, pill only, natural methods only, and pill and at least one natural method). In Mauritius, the number of physicians representing each category corresponded closely with what might be expected from the total sample results. The same was true of Peru for all but two patterns; there appeared to be an overrepresentation of physicians not willing to recommend any of the four methods and an underrepresentation of those willing to recommend only the pill. In the Philippines, physicians willing to recommend all four methods and those willing to recommend only natural methods appeared to be overrepresented; those willing to recommend the pill and at least one natural method, and especially those willing to recommend only the pill, were underrepresented. In Sri Lanka, physicians willing to recommend only the pill or the pill and any natural method were overrepresented, whereas those willing to recommend only natural methods or no method were underrepresented. Thus, the greatest differences were between the Philippines and Sri Lanka.

Discriminant Function Analyses

Table 3.4 shows the capability of the nine scales assessing perceived characteristics of the methods to predict whether a physician will recommend a particular method to his or her patients. As already noted, previous research has indicated that the choice of one contraceptive method is often strongly

Table 3.4. Discriminant function analyses of physicians' recommendations regarding four contraceptive methods

Characteristic	Pill		Calendar		Temperature		Billings	
	Pill	Other	Calendar	Other	Temperature	Other	Billings	Other
Health risk	.25	.06(C)	.12	-.05(T)	-.03	.10(C)	.07	.06(C)
Cost	-.04	-.07(C)	.11	-.22(B)	.11	.24(C)	-.06	-.08(C)
Inconsistency with religious and social norms	-.06	-.09(C)	.14	.10(T)	.25	.31(C)	.26	.15(C)
Knowledge of bodily functions required of patient	.02	.11(B)	.06	-.15(P)	-.03	-.34(P)	.06	-.27(P)
Certain and easy characteristics	.31	-.04(C)	.05	.11(P)	.26	.04(P)	.14	-.04(T)
Physician requirements	-.08	.12(C)	-.03	-.12(T)	-.09	-.07(C)	.06	.00(C)
Method's ease on partner relationships	.06	.03(B)	-.28	.17(P)	-.28	.13(P)	-.30	.09(P)
Patient requirements	.25	-.11(T)	.14	.05(P)	.25	.08(P)	.30	.05(P)
Good, scientific, and useful characteristics	.76	-.25(T)	.56	-.39(P)	.54	-.36(P)	.61	-.31(P)
Country	.12		-.05		-.16		-.04	
Percentage correct								
Not recommend	75.0%		85.3%		69.4%		77.9%	
Recommend	82.1%		74.2%		70.8%		78.1%	
Total	81.1%		81.2%		69.9%		78.0%	
Canonical R	.50		.63		.41		.58	
Wilks's lambda	.75		.60		.83		.67	
Chi square	67.3		119.9		52.9		90.3	
Probability	.0001		.00001		.00001		.0001	

Note: Discriminating variables reflect perceptions of the method being rated *and* the most favorable rating on each characteristic for any *other* method. Entries represent structure coefficients (correlations with the discriminant function).

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influenced by perceived negative characteristics of the alternatives. Consequently, we performed four discriminant function analyses (one for each family planning method) with 18 bipolar perception ratings (each of nine perceived characteristics of both the given method and the most positive rating on each characteristic for any other method) as potential predictors of the physicians' recommendations. A nineteenth predictor, a dummy variable for country, was included. The analyses produced highly statistically significant discriminant functions for each of the four methods.

Several observations can be drawn from these correlation coefficients. The single most powerful predictor was the perception that a given method was good, scientific, and useful. This predictor was often followed closely in importance (especially for the natural methods) by the perception that an alternative method was bad, unscientific, and not useful. Another important predictor was the perceived difficulty for the patient of using the method. Being "certain and easy" was important to physicians recommending the pill and temperature methods, whereas the effect on partner relationships was particularly important to physicians recommending natural methods. The country was not a strong predictor in these analyses, although it had some influence over the choice of the pill and temperature methods.

Table 3.4 has 36 pairs of coefficients, in 22 of which the given method has the greater coefficient, or predictive influence. For the natural methods, the perception of the alternative method (the pill) as not good, scientific, and useful was more influential than any of the other perceived characteristics of the particular natural method.

The characteristics of the calendar method that seemed to be most important to physicians in comparing this method with alternative methods were health risk, cost, cultural conflict, and physician requirements. In contrast, for the pill the salient characteristics used in the comparisons were knowledge of bodily functions required by the patient, certainty and ease of use, effect on partner relationships, patient requirements, and whether the alternative was good, scientific, and useful.

DISCUSSION

Because of physicians' influence over patients' contraceptive choices, we thought they would be an appropriate group to canvass about their perceptions of the strengths and weaknesses of contraceptive methods. Initially we identified 16 attributes of 17 contraceptive methods (in addition to the dimensions of traditional to modern and natural to artificial) that we thought influenced physicians' willingness to provide or recommend those methods. After collecting the data, we reduced the number of dimensions by factor analytic procedures from 16 to nine. The nine items were health risk, cost, degree of cultural and religious conflict, required knowledge of bodily functions on the part of the user, extent to which the

method was certain to work and easy to use, requirements on the part of the physician, effect on the partners' relationship, requirements on the part of the user, and the extent to which a method was considered to be good, scientific, and useful.

The results of our investigation, conducted in four countries, indicate that physicians have multifaceted perceptions of contraceptive methods. That is, they place the methods in various perceptual spaces, ordering them along such dimensions as high to low health risk, high to low cost, great to little strain on partners' relationships, traditional to modern, and natural to artificial. By understanding the relative positions of various contraceptive methods along these dimensions, it is easier to understand why physicians favor some methods over others.

For the total population of physicians studied, the Billings method was thought to be the most modern of the natural methods; breastfeeding, withdrawal, and calendar-rhythm excellent examples of natural and traditional methods; and vasectomy the most modern of the artificial methods. Three methods were rated as artificial and traditional to varying degrees: the condom, douche, and herbals.

Results of the semantic differential analysis of physicians' perceptions of the contraceptive methods had the most theoretically intriguing implications of the study. General studies of attitude-behavior relationships (e.g., Fishbein and Ajzen 1975; Ostrom 1969) and specifically of the attitude-behavior relationship as regards fertility and fertility regulation (e.g., Davidson and Jaccard 1979; Pagel and Davidson 1984) have suggested the utility of attempting to relate cognitive constructs to behavioral dispositions and decisions of contraceptive choice. The plea to insure that the assessed cognitive constructs be relevant to the behavior being investigated, whether it be sexual behavior, contraceptive behavior, or fertility behavior (Severy 1979); the implications of within- versus across-subjects procedures (Davidson and Morrison 1983); and the influence of the context of alternatives (Jaccard 1981; Severy 1982) all serve to improve the theoretical model and increase the viability of mapping the relationships between cognitive constructs and behavior.

Believing that the essence of the attitude construct reflects an affective, evaluative response, we predicted that the perception of a method as being good, scientific, and useful would overwhelm its other perceived characteristics and be highly related to method choice. We found solid support for this hypothesis. When we ran discriminant function analyses using the nine perception dimensions and four countries, the analyses for four contraceptive methods (the pill, the Billings method, temperature, and the calendar method) indicated that the perceived attribute of good, scientific, and useful was the single most important predictor, and that usually the perception of alternative methods as bad, unscientific, and not useful was

the second most important predictor. Another factor affecting physicians' recommendations of all four methods was the number of requirements placed upon the patient for appropriate use of the methods. Clearly, physicians were concerned about the method from the perspective of patients.

Physicians' ratings of attributes and their decisions about choices seem to be made in the context of alternatives. Our analyses indicated that the pill and the calendar-rhythm methods served as the standards for comparison. Given that most physicians ascribed similar characteristics to the three natural methods, it is surprising that the other natural methods did not serve as the considered alternative at a rate similar to calendar-rhythm.

Curiously, the perceived characteristic having the least effect on the physicians' recommendations was the physician requirements. Each of the other dimensions, either for the given method or for the alternative, was quite important to at least one contraceptive method. Perhaps one positive and client-oriented interpretation of these data is that physicians regard the demands of a method on themselves to be the least important consideration leading to choice. Most of the other dimensions also reflect patient-oriented concerns.

It should be noted that these perceptions of the methods' characteristics are conceptually different from a precise measurement of physicians' knowledge of the methods. Information about such knowledge would be an important part of a more complete model of the relationship between physicians' cognitive constructs and their willingness to provide information to patients about contraceptive methods. It is possible to conclude, however, that the physicians included in this analysis had differing perceptions of the various methods and that those perceptions affected their willingness to provide information about specific contraceptive methods.

Perhaps patients should be taught to inquire about their physicians' views of particular methods, both the recommended methods and the alternatives. The patients themselves may have different perceptions of the methods (which may or may not be based on sound information), may give different weightings to the importance of the various methods' attributes, and reach different decisions from those of their physicians about which methods are appropriate to use.

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4 Accessibility as a Determinant of Contraceptive Method Choice

by Elise F. Jones

Interest in the availability of contraception as a topic for analysis has mounted rapidly over the last two decades, in step with concern about worldwide population growth and the consequent mushrooming of international family planning assistance programs. Usually the main goal of these programs has been to increase the supply of contraceptives, contraceptive services, and information about such methods and services. In some cases, an effort has also been made to stimulate the demand for family planning through public education. The issue of availability, however, can be seen quite simply as comprising all aspects of contraceptive supply (Hermalin and Entwisle 1985).

A distinction is often made between accessibility and availability. Availability has sometimes been taken to mean the actual presence or absence of a product or service, whereas accessibility may refer to the relative ease of obtaining it, given that it is available. In practice, it is not easy to draw a line between the two; a method that is unknown, and thus effectively unavailable, to most women in a village, perhaps because it can be obtained only in a distant city, may be perfectly accessible to the well-educated few whose horizons are much broader. Hence, the distinction is not particularly meaningful, and the two terms are used interchangeably in this chapter (as in Hermalin and Entwisle 1985).

There has been a reasonable degree of consistency in the scope and content of the availability issue as conceptualized by various researchers who have worked in this area. According to a general framework proposed in an early paper by Chai Bin Park et al. (1977), four major components of availability can be identified: economic, administrative, geographic, and cognitive. The geographic and economic aspects are the constraints of physical access and financial cost that come immediately to mind. Administrative considerations consist largely of practices regulating the operation of service facilities and the ways in which various methods can be dispensed. Cognitive availability refers to the supply of information that is required to create public awareness of methods and services. The range of potentially relevant topics mentioned by others is typically quite compatible with such an outline (see, e.g., Lewis and Novak 1982; Jones 1984; Hermalin and Entwisle 1985).

Major differences emerge, however, when it comes to translating concepts into operational terms and designing an analysis that can produce

meaningful results. Most empirical studies have been forced by lack of data on more than a few aspects of availability to interpret the issue in very narrow terms. A wide variety of approaches has been tried, but as yet none appears to have found general acceptability and applicability. Under these circumstances, it is hardly surprising that the results have often not been of direct use to program planners and policy makers.

This chapter reviews two analyses that attempt to assess how the availability of individual contraceptive methods affects their use. Both analyses are based on data from the World Fertility Survey (WFS), which has constituted one of the major information sources for research on this topic, and they illustrate some of the persistent difficulties that have yet to be satisfactorily resolved. The last section takes up these and other current issues in general terms, with a view to stimulating the development of improved approaches in the future.

THE EFFECTS OF ACCESSIBILITY ON CONTRACEPTIVE USE

Over the course of the World Fertility Survey, increasing emphasis was placed on the topic of availability of family planning services. Whereas questions on this issue were originally included only in the optional "family planning module," a set of questions was eventually designated as a supplement to the individual core questionnaire (WFS 1975, 1977). Moreover, the basis for the information to be gathered shifted from family planning services in general to a more detailed method-specific inquiry. In a parallel development, greater attention came to be given to the collection of community-level data, and it was suggested that family planning services were an appropriate topic to be covered in such surveys (Freedman 1974). Thus, both the amount of material on this topic and its complexity multiplied rapidly in the later years of the project.

The first attempts to analyze the effects of availability on contraceptive use using WFS data had revealed certain basic problems. The limitation of individual-level data on accessibility to respondents who knew of a place where contraceptives could be obtained made it impossible to determine whether the failure to find an appreciable negative effect of accessibility on use meant that it actually did not matter or whether it acted mainly to influence which women knew of sources (Rodriguez 1978; Pebley and Brackett 1982). Another explanation proposed for the absence of expected effects, specifically effects of travel time, on use was that the measure of travel time yielded by the early surveys referred only to a general family planning outlet, lumping together methods that involved very different patterns of timing of visits to a source (Chidambaram and Mastropalo 1982).

Hence, expectations were high that, as more community-level information and more method-specific data accumulated, significantly greater in-

sight would be gained. In my own comprehensive review of the WFS data on the availability of contraceptive services (Jones 1984), the opportunity arose to examine method-specific data in some depth. This study covered the first five surveys to provide material of that type (in Ghana, Paraguay, the Philippines, the Sudan, and Venezuela). No relevant community data were as yet ready for analysis, however. The results of the Egyptian survey, which included community-level as well as method-specific data on availability, are examined in a forthcoming study (Jones 1988). Findings for the Philippines and Egypt selected from these two analyses are discussed in the remainder of this section.

Philippine Study

As part of a comparative study, consideration was given to three items about contraceptive availability from the 1978 Republic of the Philippines Fertility Survey that were common to all five countries covered in the analysis.¹ Those items were the type of outlet to which the respondent would go to get a particular method, how long she estimated it would take her to go there, and how much she thought the method would cost. The results on the first of these, type of source, are highly specific to each country, however, and do not lend themselves readily to cross-country analysis. The last of the three items yielded price estimates that generally appeared to make sense, but the level of missing data tended to be very high and, in addition, it was difficult to establish meaningful equivalence across countries. Thus, the analysis was ultimately confined to a single indicator of accessibility, travel time to a source.

The methods covered were the pill, IUD, condom, and female sterilization. Respondents who were currently married, below age 45, exposed to the risk of conception, and aware of a source for the method in question were considered eligible for the analysis, on the assumption that these were the women who realistically had the option of using a given method. Women who neither were pregnant at the time of interview nor reported themselves as infecund were considered to be exposed to the risk of conception. One consequence of the restriction to respondents who knew of a source for a particular method was that the base populations for the analysis of use of the various methods differed, and each method had to be examined as a separate exercise. Knowledge of sources for the pill was very widespread in the Philippines, but only 61 percent of all respondents knew of a place where female sterilization was provided.

1. The multivariate analysis of the effects of availability on contraceptive use in the Philippines that is described in this section is taken from the appendix, prepared in collaboration with John McDonald, in Jones (1984).

With the focus of attention on a given method, four options pertaining to contraceptive use are of most interest: whether the respondent was currently using that method, whether she was using another efficient method, whether she was using an inefficient method, or whether she was not using contraception at all. Hence, the dependent variable for the analysis of use of each of the four methods was a nominal variable comprising four categories.²

Five explanatory variables were selected; all were categorical in form, with one category arbitrarily designated as the reference group. Three of these were background variables, included as controls: number of living children, years of education, and urban or rural residence. The other two, which relate to contraceptive accessibility, were the focus of attention: travel time to a source for the method in question and relative accessibility of other efficient methods.

Travel time to the method source was represented in three categories. Since the estimates of time reported by the respondents varied systematically from method to method, the definition of the categories was adjusted accordingly. In each case, the shortest time was selected as the reference category: less than 15 minutes for the pill, IUD, and condom, and less than 30 minutes for female sterilization. Medium times were defined as 15–59 minutes for the pill and IUD, 15–29 minutes for the condom, and 30–59 minutes for female sterilization. Long times thus were more than one hour for the pill, IUD, and female sterilization, and more than 30 minutes for the condom.

The second availability variable combined the respondent's knowledge of and estimated travel time to sources for alternative efficient methods of contraception. It was defined as a simple dichotomy, again with categories that were adjusted to accommodate differences by method in the distribution of the underlying information. Greater accessibility of alternative efficient methods was designated as the reference category; for the pill and condom this indicates that a source for at least one alternative method was known, and it did not take any longer to go there than to the source for the method in question, whereas for the IUD and female sterilization it indicates that a source for at least one alternative method was known and could be reached in less time. Less accessibility of alternative efficient methods comprised all other conditions, including lack of knowledge of a source for another such method.

2. A multinomial logit model can be used to study the relationships between explanatory variables and a polytomous response variable of this sort. In the absence of a computer program for fitting multinomial logit models directly, this was accomplished indirectly by fitting the appropriate log-linear model, using GLIM, Release 3. Because the computational demands of such log-linear models are potentially prohibitive, it was essential that the model be extremely parsimonious.

The results for these two variables in the Philippines are displayed in Table 4.1. The procedure used yields a parameter estimate for every possible pair of categories of the dependent variable (use of a particular method) for each nonreference category of the explanatory variables (in Table 4.1, only travel time and inaccessibility of alternative methods are shown). For each dependent variable with four categories, there are six such pairs of comparisons (column 1 of Table 4.1). The parameter estimate (EST) indicates how the likelihood of falling into the first as opposed to the second of the given pair of categories of contraceptive use would be expected to change by shifting from the reference category of the explanatory variable to the category shown. For the individual parameter estimates, statistical significance at the .05 level is indicated by an asterisk. The *p* values provide a guide to the significance of the explanatory variable as a whole.

When exponentiated, the parameter estimates indicate the corresponding change in odds that would be expected. As an aid to interpretation, these values are shown for estimates that achieve statistical significance (ODDS). For instance, the parameter estimate of .88 for the effect of the accessibility of other efficient methods on the comparison of the first pair of categories of pill use indicates that, other things being equal, the chances of using the pill rather than another efficient method are almost two and a half times greater if other efficient methods are relatively inaccessible as opposed to relatively accessible ($e^{.88} = 2.4$).

With respect to travel time as an explanatory variable, attention can be confined to the first three pairs of categories of contraceptive use, since these are the ones that directly involve use of the method in question and the goal is specifically to understand how accessibility influences the use of this method. Negative parameters (decreased odds) would be anticipated in each case, with the suggested decline in use of the method in question greater for the longest category of travel time than for the intermediate category.

In general, the results are disappointing; neither the signs nor the values of the parameter estimates present a consistent pattern. Only in the case of the condom do the expected effects emerge unequivocally. Compared with respondents living within 15 minutes of the source that they would use for the condom, those living 15–29 minutes away were about two-thirds as likely to be using the condom as either another efficient method, an inefficient method, or no method. If the travel time were half an hour or more, the likelihood of using the condom dropped further to around half that of women living within 15 minutes of the source. It is not particularly surprising that this is the example in which the results are most clear-cut; the condom is the method for which supplies are typically sought most frequently, and thus travel time would be expected to have the greatest effect. Rather puzzlingly, other scattered evidence of statistical significance for travel

Table 4.1. Effects of travel time to a method source and relative accessibility of other methods on use of the pill, IUD, condom, and female sterilization among currently married, exposed women below age 45 knowing of a source for the specified method: Philippines
(Effects controlled for number of living children, years of education, and urban/rural residence)

Method and dependent variable	Travel time				Other method inaccessible		N	
	Medium		Long		EST	ODDS		
	EST	ODDS	EST	ODDS				
Pill								5,126
1. Pill vs. other efficient method	.20		.27		.88*	2.4		
2. Pill vs. inefficient method	.09		-.09		1.07*	2.9		
3. Pill vs. nonuse	.06		-.22		.93*	2.5		
4. Other efficient method vs. inefficient method	-.11		-.36*	.7	.19			
5. Other efficient method vs. nonuse	-.14		-.49*	.6	.05			
6. Inefficient method vs. nonuse	-.03		-.13		-.14			
IUD								4,830
1. IUD vs. other efficient method	.22		.35		.24			
2. IUD vs. inefficient method	.13		.15		-.14			
3. IUD vs. nonuse	.02		.00		-.18			
4. Other efficient method vs. inefficient method	-.09		-.20		-.38*	.7		
5. Other efficient method vs. nonuse	-.20*	.8	-.35*	.7	-.42*	.7		
6. Inefficient method vs. nonuse	-.11		-.15		-.04			

Condom							5,027
1. Condom vs. other efficient method	-.43*	.7	-.50*	.6	.80*	.4	
2. Condom vs. inefficient method	-.37*	.7	-.63*	.5	.97*	.4	
3. Condom vs. nonuse	-.37*	.7	-.66*	.5	.89*	.4	
4. Other efficient method vs. inefficient method	.06		-.13		.17		
5. Other efficient method vs. nonuse	.06		-.16		.09		
6. Inefficient method vs. nonuse	.00		-.03		.08		
Female sterilization							4,180
1. Female sterilization vs. other efficient method	-.17		-.32		-.37*	.7	
2. Female sterilization vs. inefficient method	-.21		.23		-.39*	.7	
3. Female sterilization vs. nonuse	-.10		.21		-.29		
4. Other efficient method vs. inefficient method	-.04		-.09		-.02		
5. Other efficient method vs. nonuse	.07		-.11		.08		
6. Inefficient method vs. nonuse	.11		-.02		.10		

Source: Jones (1984:tables A1-A5).

Note: Explanatory variables are defined in the text. An asterisk (*) indicates that an individual parameter estimate is significant at the .05 level. The significance levels for the explanatory variables as a whole are as follows: travel time— $p < .05$ for the condom, otherwise not significant; accessibility of other methods— $p < .001$ for the pill and the IUD, $p < .01$ for the condom, $p < .05$ for sterilization.

time usually involves parameter estimates for the remaining three pairs of categories of contraceptive use, which are of less immediate relevance and somewhat hard to interpret.

Relative inaccessibility of alternative efficient methods of contraception should decrease the likelihood that a woman would be using any of these methods rather than the method in question, an inefficient method, or no method, leading to positive parameter estimates (increased odds) for the first pair and negative estimates (decreased odds) for the fourth and fifth pairs of categories of contraceptive use. It might also increase the likelihood that she would be using the method in question as opposed to an inefficient method or no method at all, resulting in positive estimates for the second and third pairs of categories of contraceptive use. There is some evidence of such effects. All of the first three parameter estimates for pill use are positive, and strongly so. Less access to other efficient methods is also strongly associated with greater use of the condom. Interestingly, however, it tends to reduce use of female sterilization, perhaps reflecting the fact that this is a method exclusively for termination of childbearing and thus is not a real alternative for many women. In the case of the IUD, relative inaccessibility of other efficient methods seems to lead mainly to a lower likelihood of using one of them as opposed to an inefficient method or no method.

In the overall analysis, the results for the other four countries were even less conclusive with respect not only to travel time but also to the relative availability of alternative efficient methods as well. On the whole, the acquisition of method-specific data does not appear to have fulfilled its promise of making it easier to discern the effects of contraceptive availability on use. Part of the responsibility for the lack of definitive results is no doubt methodological, i.e., the necessity of using a highly simplistic model and the marginal adequacy of the sample size for the type of procedure, which was a matter of concern everywhere except in the Philippines. But there are probably other factors as well. One plausible explanation is that other characteristics of method sources may overwhelm the effects of travel time. Nearby outlets may be open infrequently, understaffed or staffed with poorly qualified personnel, or often out of supplies, so that obtaining an acceptable quality of service entails a longer journey. Another likely explanation is that the potential tradeoff among methods, a complication that arises as soon as the use of individual methods is considered, has not been adequately taken into account. The variable on relative accessibility of sources for other efficient methods attempted to accomplish this, but it is extremely crude. Finally, the possibility remains that travel time may operate principally as a determinant of who knows about sources for a given method in the first place. The study in Egypt permitted exploration of both of the latter hypotheses.

Egyptian Study

As previously mentioned, both community-level and individual-level data on contraceptive availability were collected in the 1980 Egyptian Fertility Survey, making it well-suited to an examination of the effects of accessibility on knowledge of sources as well as on use. The analysis was designed to look first at the impact of community-level measures of availability on knowledge of sources and then at the influence of both community-level and individual-level measures of availability on use among women who knew of sources. Two further advantages were the large size of the Egyptian sample (8,788 ever-married women) and the fact that the contraceptive picture was less complicated than in most other countries. The pill and the IUD were, for all intents and purposes, the only methods provided, known, and used in the country at the time.

The community-level survey was limited to the rural component of the sample (4,590 women). In addition to basic demographic data on the villages from which the sample was drawn (taken from the 1976 census records), a considerable variety of information was collected from village authorities about family planning and other services that the residents might use. For purposes of this study, six variables representing various aspects of family planning service availability were derived from the community data. These are shown in Table 4.2 and described in turn below; the *N*s in the table refer to individual respondents, to each of whom have been assigned the data from the village where she resided.

The first variable, accessibility of a family planning facility, was measured on the basis of the presence or absence of certain types of facilities and services within the administrative boundaries of the village, and, if not present, the distance to them. The second category of the variable represents villages where there was a local health facility, but a family planning center was not specifically mentioned. Since all such local health facilities in principle provided family planning services, there is no objective distinction between the first two categories, but it was thought that specific mention of a family planning center might indicate a more active service.

Pharmacies were differentiated from family planning facilities and are covered in the second variable. But the level of nonresponse on the distance to a pharmacy, if there was none in the village, was very high, precluding the use of this additional information.

Travel time to the nearest town, the third variable, refers to the travel time to the capital of the local administrative district.

The fourth variable, number of medical personnel present in the village daily per 1,000 women 15–49 years of age, includes four types of personnel, all of whom were considered to have some potential role in providing family planning services. This rather simple measure of service density is imprecise in many respects.

Table 4.2. Percentage knowing of specified contraceptive sources among currently married, rural women 15-49 years of age, by community measure of accessibility, method, and region: Egypt

Measure of accessibility	Percentage knowing of source for pill			Percentage knowing of source for IUD			Number of women		
	Lower Egypt	Upper Egypt	All rural women	Lower Egypt	Upper Egypt	All rural women	Lower Egypt	Upper Egypt	All rural women
Accessibility of a family planning facility									
FP center present	74	42	62	35	12	27	1,258	713	1,971
Other facility present	77	39	56	44	10	26	788	926	1,714
Facility within 4 kms	79	43	67	35	12	27	558	292	850
Distance to facility >4 kms	—	34	24	—	10	7	17	38	55
Presence of a pharmacy in the village									
Present	72	44	65	36	14	30	505	189	694
Not present	76	40	60	38	11	26	2,116	1,780	3,896
Travel time to the nearest town									
<15 minutes	86	39	76	49	16	42	575	159	734
15-29 minutes	75	39	59	38	12	26	1,068	873	1,941
30+ minutes	69	42	56	31	10	20	978	937	1,915
Number of medical personnel present in the village daily per 1,000 women 15-49 years of age									
None	74	40	60	34	11	25	555	379	934
0.1-1.4	58	34	40	23	10	13	198	661	859
1.5-2.9	76	47	68	40	11	32	1,067	388	1,455
3.0+	80	44	66	41	13	30	801	541	1,342

Number of years since the village
facility had been established^a

1-3	71	34	55	20	7	14	293	234	527
4+	76	42	61	41	13	29	1,912	1,458	3,370
Methods offered at the village facility ^a									
Pill only	75	41	58	36	12	24	1,631	1,629	3,260
Pill and IUD	76	64	75	44	37	44	546	27	573
All women	75	41	60	38	11	26	2,621	1,969	4,590

Source: Jones (1988:table 15.11).

Note: A dash indicates fewer than 20 cases.

^aThe category of no facility has been treated as missing data and excluded from the table.

The historical dimension of service availability is often ignored, and therefore the fifth community variable, the length of time that the facility had been in existence, was an attempt to measure this potentially important factor. Where there was no facility in the village, the respondents had to be assigned to the missing-data category.

The sixth and last variable indicates the methods available at the village facility. Women living in villages where there was no facility again had to be excluded.

The proportions of respondents knowing of a place where they could obtain each of the two methods (Table 4.2) offer some support for the hypothesis that availability affects awareness of sources.³ In particular, knowledge of sources tended to fall off quite sharply with increasing travel time to the nearest town. This variable may be misleading, however, because ease of access to a town could be indicative of many conditions associated with knowledge of sources besides actual availability of contraceptive services—better educational opportunities, more likelihood of employment in the modern sector, etc. No clear effects were demonstrated for the accessibility of a family planning facility, the presence of a pharmacy, or the density of medical personnel. The level of awareness was also appreciably higher in villages that had had a family planning facility for at least four years, and knowledge of sources for the pill as well as the IUD was greater if the facility offered both methods.

With respect to the effects of availability on method use, the tabulations utilizing the community-level measures are confined to rural women, whereas those based on individual-level measures include urban respondents as well. In both cases, consideration is limited to women who knew of a source and who were exposed to the risk of conception (i.e., were not pregnant and did not report themselves as infecund). Results are presented in tabular form only for the pill; figures for the IUD are mentioned as necessary in the text.

Variation in the proportions using the pill, according to the six community-level measures of availability (Table 4.3), is generally similar to that for knowledge of sources (Table 4.2), suggesting parallel effects at the two stages. A few points of contrast are noteworthy, however. Use of the pill was lower among women who had to travel further to the nearest town, but use of the IUD was lower (7 percent) among women living in villages less than 15 minutes away from a town than among those in villages 15–29 minutes away from a town (11 percent) or among those living half an hour

3. Since there are very substantial differences between the rural way of life in the northern part of the country, which comprises the rich delta lands of the lower Nile Valley (Lower Egypt), and that in the much less prosperous southern part (Upper Egypt), the results in Tables 4.2 and also in Table 4.3 are presented separately for the two areas.

or more away from a town (12 percent). Moreover, in Lower Egypt use of the pill was lower (20 percent) when the village facility offered both methods than when only the pill was offered (24 percent) although knowledge of pill sources was the same, but use of the IUD was appropriately higher when the village facility offered both methods (14 percent) than when only the pill was offered (10 percent).

One possible explanation for these particular differences between the results for knowledge of method sources and those for method use is the effect of tradeoff between methods. A woman can know of sources for more than one method, but in principle she can be using only one. It does not seem likely that a woman would be intrinsically more inclined to use the IUD when its source is far away than when it is close; rather, women who have sources nearby may opt for methods that require resupply more often, whereas those who live farther away elect methods that require infrequent visits.

The individual-level questionnaire for the Egyptian survey contained a fairly standard series of method-specific questions on availability. Respondents who knew of a source for the method were asked where they would go to obtain it (this information was later coded by type of source), how long it would take them to get there, and how much they thought the method would cost there.

Type of contraceptive source is a valuable piece of information for country-specific analyses because it is often the best available proxy for a host of characteristics associated with the quality and convenience of services. For program planners, moreover, it represents a "unit" of service delivery with which they deal directly. In the case of the pill (Table 4.4), Egyptian hospitals seemed to be less successful at attracting users than other types of outlet. Variation in price within the range of prices quoted appears to have made little difference in the proportion using the pill. The prices mentioned were realistic, on the whole, and as they were subsidized by the government, they actually represented an almost trivial amount of money.

Contrary to the findings for other countries, these tabulations show use of the pill diminishing markedly with increased travel time to the source. Interestingly, this inverse relationship was almost as sharp in urban as in rural areas. No such decrease, and perhaps even an increase, was evident in the use of the IUD as travel time lengthened. Again it is possible that the latter relationship can be attributed to a tradeoff effect. For the pill, however, the negative association held even when the base population was restricted to women who knew of a source for the pill but not one for the IUD, indicating that it could not be an effect due primarily to tradeoff.

I carried out a multivariate analysis in an effort to determine whether the negative relationship of pill use to travel time could be accounted for by other characteristics of the respondents with which travel time might

Table 4.3. Percentage using the pill among currently married, exposed, rural women 15–49 years of age knowing of a source for the pill, by community measure of accessibility and region: Egypt

Measure of accessibility	Percentage using pill			Number of women		
	Lower Egypt	Upper Egypt	All rural women	Lower Egypt	Upper Egypt	All rural women
Accessibility of a family planning facility						
FP center present	24	12	21	701	219	920
Other facility present	21	9	16	456	268	724
Facility within 4 kms	25	9	22	340	91	431
Distance to facility >4 kms	—	—	—	0	9	9
Presence of a pharmacy in the village						
Present	25	8	22	292	64	356
Not present	23	10	19	1,205	523	1,728
Travel time to the nearest town						
<15 minutes	30	20	29	375	41	416
15–29 minutes	21	10	18	615	253	868
30+ minutes	21	9	16	507	293	800
Number of medical personnel present in the village daily per 1,000 women 15–49 years of age						
None	24	9	20	299	104	403
0.1–1.4	18	10	13	94	167	261
1.5–2.9	22	10	20	604	146	750
3.0+	24	11	21	500	170	670

Number of years since village facility had
been established^a

1-3	22	5	17	142	60	202
4+	23	11	19	1,116	462	1,578
Methods offered at the village facility ^a						
Pill only	24	10	19	922	501	1,423
Pill and IUD	20	—	20	326	15	341
All women	23	10	19	1,497	587	2,084

Source: Jones (1988:table 15.15).

Note: A dagger indicates fewer than 20 cases.

^aThe category of no facility has been treated as missing data and excluded from the table.

Table 4.4. Percentage using the pill among currently married, exposed women 15-49 years of age knowing of a source for the pill, by type of source, individual-level measure of accessibility, and residence: Egypt

Source and measure of accessibility	Percentage using pill			Number of women		
	Urban	Rural	All women	Urban	Rural	All women
Source						
FP center	35	20	29	1,028	724	1,752
Hospital	35	16	20	109	389	498
Pharmacy	40	20	31	1,252	953	2,205
Private physician	—	—	—	7	8	15
Other	46	—	38	24	13	37
Travel time to source						
< 15 minutes	43	24	37	1,381	637	2,018
15-29 minutes	34	20	28	676	512	1,188
30-59 minutes	25	17	20	255	518	773
60+ minutes	27	12	15	45	219	264
Cost of method ^a						
No cost	—	10	8	19	29	48
1-9 piasters	40	24	34	1,110	830	1,940
10-19 piasters	44	24	34	464	498	962
20+ piasters	40	24	34	636	302	938
All women	38	19	29	2,420	2,087	4,507

Source: Jones (1988:table 15.12).

Note: A dash indicates fewer than 20 cases.

^aBecause of the large volume of missing data on method cost, the average level of use among women who answered these questions can differ more than trivially from the average shown for all women; women who did not respond were evidently (and quite appropriately) less likely to have been using the method.

be linked. The variables included were level of education, residence, and fertility preference. I used a logit model to estimate fitted proportions using the pill.⁴ As a preliminary investigation showed that there were interactions between education and each of the other variables, I performed the analysis separately by level of education. The observed and fitted proportions using the pill are shown in Table 4.5.

Among women with no formal education, who made up more than half of the eligible sample, the fitted proportions show use of the pill dropping regularly and consistently with increasing travel time to a source. The rela-

4. As before, the procedure used was GLIM, Release 3.

Table 4.5. Observed and fitted percentages using the pill among currently married, exposed women 15-49 years of age knowing of a source for the pill, by residence, fertility preference, travel time to the source, and education: Egypt

Residence, fertility preference, and travel time	No formal education		Primary education incomplete		Primary or more education	
	Observed	Fitted	Observed	Fitted	Observed	Fitted
Urban						
Wanted no more children						
< 15 minutes	51	49	51	50	46	47
15-29 minutes	39	40	40	44	52	49
30+ minutes	24	32	50	44	21	26
Wanted more children, undecided, or not stated						
< 15 minutes	18	18	25	24	33	33
15-29 minutes	15	13	20	20	33	35
30+ minutes	9	9	15	20	27	17
Rural						
Wanted no more children						
< 15 minutes	32	33	29	33	50	45
15-29 minutes	25	25	33	28	—	48
30+ minutes	22	19	26	27	—	25
Wanted more children, undecided, or not stated						
< 15 minutes	7	10	14	13	32	31
15-29 minutes	7	7	12	11	—	34
30+ minutes	6	5	10	11	—	16
Number of women	2,075		1,355		183	

Source: Jones (1988:table 15.14).

Note: A dash indicates fewer than 20 cases.

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tionship is statistically highly significant. Among women who had had some schooling, the results are somewhat less clear-cut. Thus the conclusion can be reached, tentatively at least, that the length of time required to get to a place where the pill was dispensed had a negative effect on the use of the pill independent of other factors, certainly among women who had never been to school.

In sum, the hoped-for effect of accessibility on knowledge of method sources emerged only weakly in the results of the Egyptian survey. Ironically, the effect of perceived travel time on pill use, which had largely eluded detection in other countries, was suddenly quite striking, and it does not appear to have been primarily a matter of tradeoff. Several factors can be identified that help to account for the weak effect of accessibility on knowledge of method sources. Some of them are peculiar to the Egyptian situation. A dense network of family planning outlets exists all over the country, according to both official statements and the results of this survey, yet many women were unaware of any place where they could obtain family planning services (Jones 1988). Thus, although the service could be said to be physically present, evidently it was not functioning effectively. Since the community measures of availability that were used were oriented primarily toward physical presence, they probably failed to capture the facet of accessibility that was most meaningful to potential clients.

DISCUSSION

The study of contraceptive availability continues to be fraught with difficulties. Although the conceptual outline of the problem is fairly well defined at the abstract level, its translation into operational terms remains for the most part at a rudimentary stage. No clear direction exists with respect to choice of analytical approaches and priorities for data collection. This concluding section focuses on several broad and inextricably related questions that appear especially pressing at present.

The Effects of Accessibility

The availability of contraceptives can affect contraceptive practice in three ways.

First, it can determine the level of knowledge of methods and method sources. For any one of the efficient, modern methods of contraception to be used, it must be cognitively available; that is, both the method itself and a place where it can be obtained must be known. The strength of this effect is negatively related to the level of awareness of methods and sources and thus to the level of accessibility itself; it may well be of overwhelming importance in the early stages of a family planning program. Study of the effect of accessibility on knowledge of methods and sources requires community-level measures of availability. When such community-level

measures are used to assess the relationship between accessibility and contraceptive use directly, this first type of effect is incorporated into the results.

Second, accessibility influences method use among women (couples) who are aware of at least one method and a place where it can be obtained. This effect should hold for all methods; the results can be expected to show variation from method to method, depending upon the aspect of accessibility under consideration. For example, with greater travel time and hence less accessibility to the source of contraception, there should be less use of supply methods, such as the pill and condom, than of clinic methods, such as the IUD and female sterilization, because of differences in the implied frequency of visits. This is the issue that has received the most attention, but the results have rarely been disentangled from the first type of effect, on knowledge of methods and method sources, or the third type of effect, on method choice.

The effect on method choice refers to the shift in method mix with variation in accessibility; I have termed it a tradeoff effect in this chapter. Given the availability (and awareness) of multiple methods, a woman who lives close to a family planning outlet may be likely to opt for a supply method, whereas a woman who lives farther away may opt for a clinic method. In this situation, it is not possible to determine the effect of travel time per se on their use of either method. Many of the analyses that find an impact of travel time on method use and attribute it to the second type of effect are in fact including effects of this third sort. The apparent effect of accessibility on the use of supply methods can be exaggerated or, alternatively, positive effects of decreasing availability on the use of clinic methods may be suggested. In a country where female sterilization was promoted, for example, large effects of travel time on pill use might be found simply because more women opted for sterilization as the length of the journey to obtain the pill increased.

It may be argued that this tradeoff among methods is just another part of the overall effect of availability, but the point I am making here is that it undermines efforts to assess the effects of accessibility on contraceptive use based on method-specific data. Evidently, the collection of such data, which is in itself a burdensome task, has not made it possible to study individual methods or groups of methods in true isolation from one another.

Nonuse As an Option

There is considerable uncertainty as to how best to model the decision to use a method. Is it essentially a choice among all available options, including nonuse of any method as well as use of traditional (less effective) methods? Or is it rather a two-stage process in which the decision to contracept is primary, followed by selection of a method? The latter often seems to be analytically preferable, one reason being that in practice it is difficult

to define the appropriate base population of exposed women for whom contraceptive use can be said to be a realistic option, whereas once a way has been found around this hurdle, the range of methods from which a selection must be made can usually be established quite easily. Such an approach is taken, for instance, in Akin et al. (1985a). But, for many women, the former view may be more realistic; that is, they will adopt a method they have heard about and that appeals to them, or they will continue not to use anything. Data from the Contraceptive Prevalence Surveys indicate that method preferences do exist (Cornelius and Novak 1983), although such preferences are likely to be partly a function of accessibility. Since various views of the decision-making process are plausible, it seems important to take explicitly into account the implications of whichever model is employed and, insofar as possible, to make use of the least constraining model.

Methods versus Sources

Methods and outlets are equally fundamental elements of a family planning program, yet to date much more emphasis in research has been placed on the former than on the latter. Devoting more attention to sources of contraceptives and to the interconnections between methods and sources should prove productive. Considerable variation among countries exists, however, in types of source, their role in the overall picture, and their special characteristics; the possibility for comparative analysis of such data across countries is very limited.

The growing diversity of contraceptive supply mechanisms reinforces the need to think more in terms of outlets. For instance, many countries have introduced community-based distribution programs or house-to-house delivery systems, largely in an effort to minimize problems of geographic accessibility. In such situations, questions about travel time become meaningless, while the frequency and reliability of the service presence emerge as critical issues. Social marketing programs represent another innovation that usually revolves around outlets in the private sector. In general, it is essential to take the private sector into consideration wherever it plays a significant role in the overall supply of contraceptive services, even if it is viewed as being essentially outside the scope of family planning policy decisions.

Substantive Coverage

As indicated at the beginning of this chapter, the topic of accessibility covers many characteristics of contraceptive supply systems. Until now, analysis has been restricted almost exclusively to travel time to a source, with some attention given also to costs. The quantitative characteristic of these two factors facilitates their use in analysis, and the underlying data can be collected relatively easily at the individual or the community level. But travel

time and cost are not the only elements of accessibility, and it is possible that their effects have been obscured by other factors not controlled for. This omission is probably the greatest shortcoming of the work that has been done based on national-level fertility surveys.

Attempts to broaden the individual-level inquiry have not been particularly successful. Data on method of transportation have produced few meaningful insights, and general questions on satisfaction with services have evoked few negative responses (Jones 1984:table 28). Community-level surveys, however, provide a promising opportunity for the collection of relevant information because the number of communities (sampling units) involved in a given survey is usually small, and a wealth of data can be obtained without great cost. Nevertheless, much work still needs to be done to assure the quality and the analytical utility of material obtained in this way (Chayovan et al. 1984). Moreover, as Hermalin and Entwisle (1985) have noted, with an increasing volume of data available for analysis, there will be a compelling need for parallel efforts to develop techniques for managing its complexity and structuring it productively.

5 The Effect of Contraceptive Prices on Method Choice in the Philippines, Jamaica, and Thailand

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An important question for population policy is whether reductions in population program funding will disrupt family planning program operations and thereby lead to higher birth rates among the poor in Third World countries. In recent years, researchers have emphasized prices and accessibility as important factors in the decision to use contraceptives and in the choice of contraceptive method. If time and money are important, then increases in prices and reductions in accessibility, as a result of decreases in the funding of population programs, may result in higher birth rates among women who practice contraception but who, as a result of such changes, choose to use less effective contraceptive methods. Few studies, however, have examined the implicit assumptions behind the family planning policies of low or zero prices and easy accessibility. Recently there has been great interest among the international aid agencies, the donor countries, and the poorer nations in the prospects for more self-finance of family planning programs. Perhaps the most important question to be answered in designing self-financing efforts is how sensitive potential users are to the prices charged for contraceptives.

The research presented here is part of an ongoing effort designed to investigate the effects of economic factors on the choice of contraceptive method. We report the results of two completed studies. The first analysis is based on data from the Republic of the Philippines Fertility Survey, conducted as part of the World Fertility Survey (WFS) in 1978 (Akin et al. 1985b). The Philippine survey provided the best price and time-cost data for contraceptives available at the time. The need for better and more complete contraceptive price data led us to conduct two additional surveys in Jamaica and Thailand in 1984 for the second study (Akin and Schwartz 1988). This chapter compares the results found for the effect of contraceptive prices on contraceptive method choice in the three countries.

CONCEPTUAL FRAMEWORK

The theoretical underpinnings of the research are derived from several disciplines. Demographers, economists, and sociologists, among others, have

studied the relationship among various causal factors and contraceptive usage patterns. Much of the emphasis in past research has been on whether couples choose to use contraceptives at all; a vast literature exists on the determinants of the decision to delay pregnancy (child spacing). The question to be answered by those making the contraceptive use decision is whether a child (or another child) is desired, and if so, at what time. Our interest in this work, however, is not to explain spacing behavior, or in the process to attempt to build a logical behavioral model to explain the patterns of desire for children, but rather to explain the choice of the means used to space or delay childbirth by those who, for whatever reasons, have decided to attempt to delay the next birth. We focus on this very important "choice of method" question, and in so doing set up our overall approach in a manner that avoids the necessity of explaining the causes of the spacing and birth delaying decisions.

The literature on the choice of contraceptive methods (either effective or ineffective) by users is small and almost devoid of work relating price to purchasing behavior. Economists have done much work on birth spacing, and the modeling generally views the demand for children as being based either on the investment objective of increasing future earnings or on the consumption objective of enjoying children. (See Newman 1983 for a review of the economics literature on child spacing.) How household income, prices, and availability of contraceptives of each type interact with taste-related socioeconomic characteristics of the consumers to determine choice of method (or of no effective method in some cases) by those who wish to delay or prevent a pregnancy has received little attention.

In a few instances, researchers have added to their models such variables as whether free pills are available (Knodel et al. 1983), or even the prices of available methods (Deeb and Casterline 1983), but they have omitted major modeling components (such as income of the household) needed to relate prices to use. A study by Pebley and Brackett (1982) did report on the use of the Philippine WFS data to estimate price effects, but because estimation of the parameters of an economic demand-based model was not a major objective of their work, they did not include in their report either the model or the estimation results.

Much of the analysis to date relating economic variables to contraceptive use has, in essence, examined how knowledge of types and methods (often called "availability" in empirical work) relates to the method chosen. Some of the studies add controls for such things as whether the respondent says that supplies are available in the home at the time of an interview, the time necessary to obtain the method, and whether the method can be obtained free or at a positive money price (see, e.g., Cabigon 1984 for an excellent study using the Philippine WFS data). The consensus from such studies has been that accessibility sometimes matters, but that prices do not affect method choice.

It is our contention that the past results on prices, time costs, and accessibility may be misleading because they were not based on a fully specified behavioral model in which the causal paths of each factor's effect and all of the important constraints that influence purchase decisions (especially income and all relevant prices) were systematically included. A well-developed economic model of demand exists and suggests that prices and effectiveness of available methods, as well as income, time costs, time constraints, supply peculiarities (such as lack of availability of certain methods), and noneconomic factors affecting tastes and desires, must all be controlled if statistical analysis is to estimate correctly how the various economic and noneconomic factors affect use.

In the analysis that follows, a mixed conditional/unconditional multinomial logit econometric model is used to estimate an economic model of method choice. The parameters of the model are estimated to determine how prices, other socioeconomic factors, and the interactions of these variables affect the specific choice of contraceptive method. The results indicate in general that the choice of contraceptive method is related negatively to price (i.e., as price increases consumers are less likely to use the method) but that the magnitude of this price effect is not large for many efficient contraceptive methods. The implication of these findings appears to be that raising contraceptive prices over observed ranges in the Philippines, Jamaica, and Thailand would cause little reduction in use for certain contraceptive methods. If this is the case, then significant cost recovery could be accomplished by such price increases for these contraceptives (e.g., pill, IUD, and sterilization). The choice of other contraceptive methods, most notably condoms, we found to be more sensitive to price, and increased prices for those methods are likely to reduce use significantly. We also determined that price changes over the range of prices observed in Jamaica and Thailand did not appear to have a significant effect on the decision of whether to use contraceptives from free sources or from sources charging a positive price.

Methods of Estimation

To determine the effect of price on the choice of contraceptive method in each country, we carried out a multivariate estimation of a system of equations, one equation for each type of contraceptive method. The basic economic model suggests that the purchase of any item for consumption should be related to its price, the price of all other goods and services available for purchase (i.e., that relative prices of all goods and services and their characteristics determine demand), the household's income (or ability to purchase), and the household's tastes and preferences for various goods and services (including contraceptives).

In practical attempts to estimate such relationships, such control variables as age, education, region of residence, and occupation are used as

proxies for tastes and preferences for the goods being analyzed. To estimate such a theoretical model based on demand for contraceptive methods, it is necessary to estimate a system of equations including all method types, because each method has a whole set of related characteristics such as purchase price, time cost, and effectiveness. Each method is therefore effectively different from the others, and in general only one of these methods, or goods, will be purchased. By estimating a system of equations in which the purchase price, time costs, and effectiveness of each method are included as choice-specific variables, and by including other causal factors that may determine choice of method but not vary by choice of method (e.g., household income), we can determine how relative prices, time costs, effectiveness, and other causal factors affect the choice of each method.

The method for estimation that we chose to use was the mixed conditional/unconditional multinomial logit technique.¹ This method assumes that the choices are mutually exclusive—that an individual cannot choose more than one method at a particular time. Although this restriction is not necessarily valid for all goods, it is both reasonable for contraceptive methods and valid for data sets in which respondents designate only one of the contraceptive methods as that currently used. In the Philippines, six categories of contraceptive method were included: abstinence, rhythm or withdrawal, condom, IUD, pill, and no method used. In Jamaica four contraceptive method categories were included: condom, injectables, pill, and natural methods. In Thailand, there were six categories: condom, IUD, injectables, pill, sterilization, and natural methods. In Jamaica and Thailand, natural methods included abstinence, rhythm, and withdrawal. These methods were combined owing to the small sample sizes in each country.

Very few women in the Jamaican and Thai samples reported that they were attempting to delay pregnancy but were not using any method of contraception. Of these, fewer than five in each country had complete information for the estimation, and they were subsequently dropped as a category from the analyses.

The estimation was “mixed” in the sense that conditional and unconditional variables were included as right-hand independent explanatory variables. Conditional variables are those that are choice-specific, i.e., characteristics of the contraceptive method. Examples of those used in the estimation are the price of protection per time period for each possible method, the time cost required per time period to travel and wait for each of the possible methods, whether a donation is given in lieu of payment for each method, and the percentage effectiveness of each method. Our assumptions of the percentage effectiveness of contraceptives were taken from

1. Akin and Schwartz (1988) first used the mixed multinomial logit technique to estimate the choice of contraceptive method. See Maddala (1983) for a detailed description of the technique.

Hatcher et al. (1985). Unconditional variables are those factors that are thought to influence the choice of method but are not characteristic of the method chosen. They include such characteristics of the woman, her partner, and her community as household income, education, age, race, urban or rural residence, and occupation.

The multinomial logit model's dependent variable can be expressed as the log of the ratio of two of the possible choices. For the case in which the independent variables contain both conditional and unconditional variables, the model becomes:

$$\ln [P_j/P_1]_i = \alpha (X_{ij} - X_{i1}) + \beta_j Z_i \quad (1)$$

$$i = 1, \dots, n$$

$$j = 2, \dots, m$$

where m is the number of contraceptive methods, n is the number of individuals in the sample, X_{ij} represents the conditional variables, and Z_i represents the unconditional variables. Only one estimate of α is obtained for each conditional variable, and there are $m-1$ estimates of β_j for the unconditional variables. Because the values of the conditional variables depend upon the contraceptive method chosen as a result of this choice process, only one parameter estimate for each conditional variable is obtained. The unconditional variables are invariant to the method chosen, and changes in the unconditional variables are allowed to have different effects on the probability of choosing each method.

The mixed model can be explained at a more intuitive level. Effectively what is estimated is a set of observations for each individual in the sample. In a two-choice situation—condoms or pills, for example—for the first woman there are effectively two observations. For the first observation the dependent variable, use of pills, takes a value of 1, the conditional variables take the value conditional for pill time and prices, and effectiveness and the unconditional variables take their values for this woman. The second observation for this woman shows a zero value for the dependent variable (use of condoms), the conditional variables show the condom values for time cost, price, and effectiveness, and the unconditional variables are the same as before. The method then makes use of the information on prices, time cost, effectiveness of the method chosen, and the fact that it is chosen, as well as of the information on prices, time cost, effectiveness of the method or methods not chosen and the fact that they are not chosen. The method effectively uses the information on relative prices, time costs, and effectiveness for all methods, but it determines only one coefficient for each conditional variable. Having only one price coefficient is very useful in the sense that users of the findings are better able to comprehend and absorb one price coefficient estimate rather than numerous estimates.

There was an important difference in the overall estimation approach we used for the Philippine analysis and the Jamaican and Thai analyses. Contraceptives are available free of charge to the entire population at clinics in all three countries. Yet we know, and the data indicate, that a sizable proportion of women choose to pay for their chosen contraceptive method. In the Philippines women may obtain condoms, IUDs, and pills free of charge at family planning clinics, obtain these contraceptives gratis and pay a modest donation at the clinics, or pay a positive price to obtain these contraceptives from commercial sources. We included all women in our mixed multinomial logit estimation of the Philippine data and included reported zero and positive prices. To control for differences in method choice for those who gave a donation for contraceptives they received at free clinics, we included a dummy variable as an independent conditional variable. In the Philippines, fewer than 16 percent of the sample women paid anything for their contraceptives.

The Jamaican and Thai samples of women contained much larger percentages who paid money for their contraceptives, and therefore we divided each of those samples into two distinct groups, those who obtained contraceptives free of charge and those who paid a positive purchase price for contraceptives. Since we knew that contraceptives might be obtained free of charge by everyone in each country, it was reasonable to expect that, for the women who chose to pay for contraceptives, a positive purchase price within the relevant range would do little to influence the decision of whether to obtain the method free from a clinic or to pay the purchase price. The lack of a price effect on the choice between free and priced sources for the whole sample is a testable hypothesis, however; and the first stage of the analysis for Jamaica and Thailand was designed to examine this question by predicting how members of the sample in each country would be divided into the groups who received contraceptives free of charge and those who either paid a positive purchase price or used natural methods that never have a money price (rhythm, abstinence, withdrawal, breastfeeding, etc.).

The first estimations in the Jamaican and Thai analysis were done to determine the factors that explained which women chose to be in the free and nonfree method groups. We used the following binomial logit equation to estimate the probability that an individual would choose a contraceptive method *not* supplied free of charge as a function of the prices of priced contraceptives, the value of the time required to obtain each contraceptive type, and other socioeconomic factors:

$$\ln [P_i/(1-P_i)] = X_i\beta \quad (2)$$

where P_i is the probability that the i th individual chooses to pay a positive purchase price or use natural methods, X_i represents observable variables for individual i , and β represents the parameters to be estimated.

DATA DESCRIPTION

Philippines

The Philippines Fertility Survey interviewed approximately 9,200 ever-married women between the ages of 15 and 49. From this initial sample, we eliminated women who were currently pregnant or trying to get pregnant, women who were not fecund, and women who were not exposed to the risk of pregnancy. The reduced sample contained 6,120 women.

Problems with the price data caused us to reduce the sample even further. All Philippine residents can obtain each of the priced contraceptive methods free of charge at family planning clinics. For the pill, IUD, and condom, approximately 84 percent of the respondents stated that family planning clinics were the source they would use to obtain these methods. Respondents were much less clear about sources of sterilization. Approximately 65 percent stated that they would obtain the operation from a clinic, but more than two-thirds of the sample were either unsure of the cost or not aware of sterilization as a method of contraception. Both the theoretical model and our method of estimation required complete price data on all methods available to the consumer. If sterilization were included in the choice set, the usable sample size would drop to fewer than two thousand individuals. We therefore decided to drop sterilized individuals from the model.

We did, however, include them in one test run in which all prices were dropped from the model so that we could see how the remaining coefficients were affected by the sample selection rule. Fortunately, the estimated coefficients for this run were quite robust and similar to those obtained from the sample excluding sterilized women. There were also no sign reversals or significance magnitude changes from the reported results.

Dropping the 529 sterilized individuals left us with a sample of 5,591. We were forced to reduce the sample size further by the necessity of dropping individuals who did not have knowledge of all six methods. This left us with 4,109 individuals who were aware of all available methods. As an additional test for bias, we estimated one model specification in which these individuals were returned to the sample and the price variables were dropped. Again we found that the estimated coefficients were robust to our sample selection rule.

Several assumptions were necessary to obtain the time cost (in minutes) of obtaining condoms, IUDs, and the pill for one year. We assumed that condoms were purchased five times a year, that an IUD would last three years, and that pills were purchased twice a year. Division by these constants (5, 3, and 2), to normalize all time costs to a per year basis, has no effect on the significance of the coefficients estimated in the mixed multinomial logit model, but it does allow the dependent variable to be defined as a period of protection obtained from the chosen contraceptive method.

Even after we restricted the sample to individuals who knew about all methods, there were still a few missing values for actual prices. For those individuals unable to supply price data who said that they would obtain the particular type of contraception from a commercial source or private physician, we assigned a price equal to the average of the reported non-zero prices for that source. This was done for approximately 5 percent of the sample. For those individuals who said they would obtain the contraceptive method from a family planning clinic, we assigned a price of zero to the method. This was done for approximately 15 percent of the sample for pills and condoms and 35 percent of the IUD sample.

The reported prices of condoms, IUDs, and the pill were also adjusted to obtain the cost for a year of protection. The price of condom protection for one year was calculated to be the reported price per unit times the frequency of intercourse per week, times 52 weeks. The price for pills was obtained by multiplying the reported price by 12, and for IUDs by dividing the reported price by 3.

Variable definitions and descriptive statistics for all the variables used in the multinomial logit analysis of the Philippine data are given in Appendix Tables 5.1 and 5.2. The mean prices for condoms, IUDs, and the pill are total sample averages and therefore include a significant number of observations for individuals who obtained those methods free. The mean price of each method for those who paid for it is much larger. For condoms, the average positive price was \$9.49 per year; for IUDs, \$1.38; and for the pill, \$4.25.

Jamaica and Thailand

Because of our experience with the Philippine data, and in particular because of the problems encountered there with contraceptive prices, we also conducted two additional surveys for the purpose of this analysis, in Jamaica and Thailand. In each country the samples were of women from areas representative of the nation as a whole, between the ages of 15 and 45, who were married or having regular sexual relations with someone, and who were not pregnant at the time of the survey. Approximately 1,000 women were surveyed in each country.

Prices of each type of contraceptive method were standardized for all methods in the same fashion as was done for the Philippine data, with the exception that, for convenience, the prices represented one month's protection.² Respondents in Jamaica and Thailand reported the prices actually

2. Although the Philippine prices were standardized for one year's protection, this did not prevent a comparison of results with those from Jamaica and Thailand, where prices were standardized to one month's protection. The estimated coefficients on price indicate the effect of changes in relative prices on the probability of the choice of contraceptive method in each country.

paid for the contraceptive methods chosen, and also the prices of all alternative methods not chosen. We used sample mean prices for the few respondents who failed to provide prices for some alternative contraceptive methods.

In addition to the prices of contraceptives reported by respondents, we collected information on the prices at contraceptive outlets in both Jamaica and Thailand, then ran a complete set of regressions for Jamaica using the outlet prices. The results were essentially the same as those reported here. These results are discussed in detail in Akin and Schwartz (1986). The Thai outlet prices are not yet available for analysis, but we are confident that the results for them will be very similar when facility-reported prices are substituted.

In contrast to the Philippine study, the time cost variables were created to fit more correctly into the context of the theoretical model. In the conceptual economic model, the correct variable for the cost of time used by the woman to obtain contraceptives is the actual time used, weighted by the opportunity value of that time if used elsewhere. An often-used procedure is to weight the various times in minutes or hours by the wage rate of the woman. The wage rate represents the dollar value of the time in the sense that it represents the market value of the time of the woman in what is assumed to be the most remunerative job she is able to find. Because of the extreme difficulties of merely obtaining household income estimates from our two data sets, we deemed it impractical to attempt to translate the income data into women's hourly wage values. We therefore used household income to weight time in each country in order to obtain the value of time variables. The assumption that household income is a reasonable proxy for women's wages is certainly defensible, especially for a regression type of usage, in which relative values are most important. We assumed that women with the highest household income would generally have the highest wage rate and that those with the lowest household income would have the lowest.³

In Jamaica only approximately one-third of the women reported their household income, and it was therefore necessary to estimate household income for the remaining respondents. Because the sample reporting income was expected to be self-selected and possibly different in behavior and other characteristics from the total sample, this income estimation process proved to be complex. We made use of a variation of the Heckman selectivity bias correction technique (Heckman 1974) to produce our income values. The first step of the technique is to estimate a probit equation of the probability of reporting household income as a function of household

3. We realize that this proxy may lead to a bias. Many women who are contracepting also work, and in such cases family income will be increased.

characteristics. From these estimated probit results are produced an inverse Mills ratio, which serves as a selectivity correction in the second stage of estimation—estimation of household income as a function of household characteristics for those who report income. The household income equation is estimated by ordinary least squares (OLS) regression, with the Mills ratio included as an explanatory variable.

This process corrects for the bias introduced into the coefficient estimates for estimation of income by respondents' self-selection into either one group that does report or another group that does not report household income. In our household income equation, the coefficients of which were used to estimate a household income amount for every respondent, it turns out that the Mills ratio was not statistically significant. This lack of significant explanatory power for the Mills ratio suggests that estimates of income based on only those who reported income would not be biased for this sample. In the interest of saving space, the results of the estimation for the Jamaica income creation are not presented.

We used the Heckman method's generated household income variable to weight the time variables in Jamaica. But in Thailand, where income values were generally reported, we weighted those variables by reported household income. Variable definitions and descriptive statistics for the Jamaican and Thai analyses are given in Appendix Tables 5.3 to 5.6.

MULTIVARIATE RESULTS

First Stage for Jamaica and Thailand

The results of the first stage of the analyses for Jamaica and Thailand indicate that, as hypothesized, prices of the various contraceptives, when purchased, were not statistically significant determinants of whether a respondent chose to pay or not pay for contraceptives available without charge. The estimated coefficients, variable definitions, and descriptive statistics for the first stage of analysis are given in Akin and Schwartz (1988). Although the best point estimates indicate that some of the prices were negatively related to the decision (i.e., higher prices tended to increase the probability that women would obtain the contraceptives at free clinics), none of the price variables, even the time cost, was found to be a statistically significant factor in the decision. Other factors appear to have been more important in the decision to use free sources. For example, in Jamaica younger women were more likely to obtain free contraceptives, as were those with lower incomes and lower educational levels, and those not in clerical occupations. In Thailand, younger women, those in rural areas, and those not in business occupations were found to be more likely to obtain from free sources contraceptives sold elsewhere.

The results of the first stage of the analysis, then, indicate that for our samples from Jamaica and Thailand, prices, both the purchase price and

the value of time required to obtain contraceptives, were not statistically significant factors in determining a woman's decision to choose free contraceptives. Because these results indicate that prices were not significant factors in the free versus nonfree decision, we focus in the remainder of the analysis for these countries on those women who chose to pay a positive price for contraceptives and those who used natural methods.

It is reasonable to expect that, for such women, a change in prices would alter the probability of choosing each of the various methods. On the basis of the first-step results, however, it is reasonable to assume that, for women who received free contraceptives, changes in the market prices would have had no effect on their method choices. The first-step results also indicate that the women who chose the priced market sources were not likely to react to price increases within the range examined by switching to free sources for contraceptives. We cannot be confident that these results would hold for very large price changes; for example, if price increases in the private sector were very large, there might be movements from the priced group to the free group. Because the focus of this study was on estimating the effect of price on contraceptive method choice, i.e., the sensitivity of method choices to prices charged, we decided to examine price changes at the margin for those who actually paid positive prices or used natural methods, and to exclude from the analysis those for whom price increases did not matter, i.e., those who were already receiving free of charge the types of contraceptives that are for sale in Jamaica and Thailand.

Mixed Multinomial Logit Results

The coefficient estimates for both conditional and unconditional variables from the mixed multinomial logit estimations are presented in Appendix Tables 5.7-5.9 for each of the three countries. In general, the results indicate that in all three countries, price was a statistically significant factor in the choice of contraceptive method. For the Philippines, the estimated coefficients for price and price squared were found to be statistically significant, indicating that the relationship between price and the choice of contraceptive method was nonlinear. In these specific results, the term on price was positive whereas that on price squared was negative. These results indicate that over some range, beginning at the lowest observed price (in this case, zero), small price increases were associated first with an increased likelihood that the method whose price had gone up would be chosen, and then with a decreased likelihood that that method would be chosen. A reasonable explanation for such a pattern would be that methods sold at very low prices are viewed with suspicion by purchasers, but that once price reaches a level viewed as "sufficient," the behavior is as predicted by basic economic price theory and any further price increases lead to a reduction of the probability of purchase.

The results of the Jamaican and Thai estimations indicate that in both countries, among women who chose not to use free sources for contraceptives, price was statistically significant and monotonically negatively related to the contraceptive method chosen. The nonlinear relationship was tested for and found not to hold in the two countries. Our interpretation of the result is that, as the price of a month's protection from a contraceptive method rises, individuals will tend to switch to other contraceptive methods. This price result was statistically significant at a high level in the Jamaican analysis ($t = -4.881$) and of a sufficient level of confidence in Thailand ($t = -1.439$) to suggest that, for individuals who buy contraceptives, prices do indeed affect the choice of method.⁴

The time cost involved in traveling and waiting for each type of contraceptive was found to be statistically significant and negatively related to method choice in the Philippines and Thailand but a statistically insignificant factor in Jamaica (although the point estimate was of a negative relationship also). Our interpretation of the results is that, in the Philippines and Thailand, as the time cost to obtain a contraceptive method increases, the probability of choosing that method decreases, but that in Jamaica the differences in the time cost to obtain the various methods do not appear to affect the choice of contraceptive method. Although the results were statistically significant in the Philippines and Thailand, however, the effect of time cost on the probability that a method would be chosen was small. (See Akin and Schwartz 1988 and Akin et al. 1985b for a detailed discussion of these findings.)

Predicted Probabilities and Price Effects

The results of the multinomial logit estimation with respect to prices are more easily understood in the context of predicted probabilities and changes in predicted probabilities. We computed the predicted probabilities for choosing each type of contraceptive method in the Philippines, Jamaica, and Thailand from the mixed multinomial logit results and for an individual with sample mean characteristics (Table 5.1). The probabilities among methods sum to 1 for each country, a necessary outcome since all individuals in each sample chose one of the possible forms of contraception (including no method in the Philippines).

In the Philippines, these results suggest that a contracepting woman who had average values for all variables (including prices and time costs faced) would have a .415 probability of using no method and only a .024 probabil-

4. An attempt was made to control for price effects that might be different for women with different fertility desires in the Jamaica and Thai models. The regression results using the controls are given in Akin and Schwartz (1988) and are essentially the same as those reported here.

Table 5.1. Predicted probability and observed frequencies of choice of contraceptive method: Philippines, Jamaica, and Thailand

Method	Philippines		Jamaica		Thailand	
	Predicted probability	Observed frequency	Predicted probability	Observed frequency	Predicted probability	Observed frequency
Condom	.0740	319	.0479	26	.0196	26
Injectable	na	na	.0976	54	.0973	69
Pill	.0830	417	.8141	242	.3528	172
IUD	.0510	253	na	na	.0288	15
Sterilization	na	na	na	na	.4624	199
Natural methods	na	na	.0404	28	.0391	16
Abstinence	.0240	103	na	na	na	na
Rhythm/withdrawal	.3530	1,417	na	na	na	na
No method	.4150	1,600	na	na	na	na
Total	1.0000	4,109	1.0000	350	1.0000	497

Note: Probabilities are predicted with all independent variables set at mean values.

na—not applicable.

ity of using abstinence. The probabilities of her choosing the other methods varied between those two extremes. It is notable that in the Philippines, a predominantly Catholic country, the combination of rhythm and withdrawal was by far the most popular of the actual contraceptive methods, with a .353 probability of choice by a woman having average values for all explanatory variables. In Jamaica the birth control pill was the most commonly purchased method, whereas in Thailand sterilization and the pill were the two most commonly purchased methods.

The responsiveness of method choice to contraceptive prices is demonstrated by increasing the price of each purchased method by one standard deviation above the sample mean price (Table 5.2). In the Philippines, the estimated effect on a method choice resulting from the statistically significant relationship of price to condom, IUD, and pill usage is seen to have been small in absolute amount, but it should be noted that the change in the probability of choosing condoms was large relative to the predicted probability of choosing condoms. The predicted change ($-.034$) represents about a 45 percent decrease in the likelihood of choosing condoms (.074). In contrast, the changes shown for the pill and the IUD were small, both in absolute amount and relative to predicted probabilities.

Table 5.2. Changes in probability of contraceptive method choice with increases in price: Philippines, Jamaica, and Thailand

Method	Philippines	Jamaica	Thailand
Condom	-.034 (\$1.22 to \$5.02)	-.0220 (\$2.36 to \$3.35)	-.0054 (\$2.22 to \$3.31)
Injectable	na na	-.0430 (\$1.73 to \$2.70)	-.0066 (\$0.59 to \$0.84)
Pill	-.001 (\$0.55 to \$2.32)	-.0878 (\$0.54 to \$1.32)	-.0186 (\$0.53 to \$0.80)
IUD	.002 (\$0.13 to \$0.50)	na na	-.0014 (\$0.31 to \$0.46)
Sterilization	na na	na na	-.0056 (\$0.16 to \$0.24)

Note: Price changes are shown in parentheses and represent an increase of one standard deviation above the mean price.

na—not applicable.

The estimated results indicating the effect of price changes on choice of method can be analyzed only by examining the coefficients on both the price and price-squared terms. When such a curvilinear relationship is observed, an important empirical question is, at what level does the normal negative price effect take hold (the threshold price)? We were able to determine that threshold price mathematically for each of our priced methods.

The threshold price at which price increases began to reduce the likelihood that any of the priced methods (condoms, IUDs, and the pill) would be selected is estimated to be \$1.35 per year. Thus, an increase of one standard deviation from the mean in the price of condoms (from \$1.22 to \$5.02 per year) resulted in a significant decrease in the probability that condoms would be selected ($-.034$). A similar increase in the price of pills (from \$0.55 to \$2.25) caused a smaller decrease in the probability that pills would be used ($-.001$). For IUDs, the one standard deviation increase in price (from \$0.12 to \$0.48) was not sufficiently large to reach the threshold price and resulted in a small estimated (insignificant) increase in the probability of use ($+.002$).

The underlying negative influence of price on the likelihood of any contraceptive method being chosen in the Philippines is more clearly demonstrated by examining changes in expected probabilities at the threshold price (\$1.35 per year, the result being the maximum probability of choice for each priced method) when prices were increased. When the threshold price was doubled (from \$1.35 to \$2.71), for example, the probability of using condoms fell ($-.007$), as did the probability of using the pill ($-.007$) or the IUD ($-.005$). That the relationship between price and the probability of using a contraceptive method priced above the threshold price was negative is particularly relevant because the mean price for individuals in our sample who actually paid a positive price was above the threshold price.

In Jamaica and Thailand, we found a similar pattern for the responsiveness of method choice to changes in prices for those who chose to purchase contraceptives. There the relationship between price and method choice was statistically significant and negative, and the interpretation of the results of price changes was more direct. Any increase in price was seen to lead to a decrease in the use of the method in question.

For example, in Jamaica the probability of choosing condoms fell by .022 percent for an individual with sample mean values of all variables when the price of condoms was increased one standard deviation from \$2.36 to \$3.35, and this change represented a large percentage decrease (about 46 percent) in the probability of choosing condoms. The change in the probability of choosing injectables ($-.043$) represented about a 44 percent decrease in the expected probability of injectables, whereas the larger change in probability for the pill ($-.0878$) represented only about an 11 percent decrease in the probability of choosing the pill.

In Thailand we found a similar pattern of price sensitivity for condoms. The $-.0054$ change in probability represented a decrease of nearly 30 percent in the predicted probability of choosing condoms. The other priced contraceptive methods in Thailand proved to be relatively insensitive to price; price increases of one standard deviation resulted in changes representing less than 7 percent of the probability of choosing injectables,

about 5 percent of the probability of choosing the pill or IUD, and less than 2 percent of the probability of choosing sterilization.

SUMMARY AND POLICY IMPLICATIONS

In separate analyses, contraceptive prices and time costs were found to be statistically significant in the choice of contraceptive method in the Philippines, Jamaica, and Thailand. For many of the priced contraceptives, however, the effects of prices were small. In particular, use of the pill and the IUD in the Philippines, of the pill in Jamaica, and of injectables, the pill, the IUD, and sterilization in Thailand appeared to be relatively insensitive to price changes. It seems that other, nonprice, factors were very important, however, in the choice of these contraceptive methods. The results suggest that decreased subsidization of contraceptives (or increases in the prices charged for them) will not significantly alter the pattern of choice for these particular methods. Price subsidies to consumers may not be necessary as long as market prices are within a "reasonable" range for these methods, although subsidies to distributors may be needed to induce them to market the methods. Some methods, including condoms in all three countries and injectables in Jamaica, were more sensitive to price changes, and the results suggest that price subsidization substantially increases their use. The removal of price subsidies is likely to reduce significantly the use of these methods in the countries examined.

The results of our estimations explaining the choice to purchase contraceptives, when free sources of them were available, are much as we hypothesized. In both Jamaica and Thailand, factors other than prices (for contraceptives priced within the ranges observed) tended to determine whether women in our sample would purchase contraceptives that were available without charge. However, the study did not determine the effect on choice of attaching a price to contraceptives that were being provided free of charge in those two countries. The results of the Philippine analysis, in which both the free and the priced sectors were combined in a single analysis, suggest that for Jamaica and Thailand the effect of choice on charging fees for certain contraceptives would likely be small, but it also could be much larger for methods sensitive to price.

In the Philippines, increases in the price of contraceptive methods might reduce the number of individuals choosing to use any contraceptive method, but this effect was also found to be small. The study did not determine whether a similar effect existed for Jamaica and Thailand.

Both free and priced sectors for contraceptives exist in all three countries analyzed. In other countries where free sources do not exist, the effects of price changes are not known. They could be minor, as found in this study, or they could be larger if those who would otherwise choose free contraceptives (but not necessarily unpriced methods) are currently

purchasing contraceptives and are more sensitive to price changes for certain methods. In principle, free services are worth introducing where they do not exist if the cost of provision is not a factor and the choice of contraceptive method is sensitive to price, but our study does not provide direct evidence on this point. Similarly, in other countries where contraceptives are provided free of charge and no priced sector exists, the effects of introducing a commercial sector are not clearly known. The results of this study suggest that it may be worthwhile to introduce a priced sector for contraceptive methods that are relatively insensitive to price, but this study also suggests that such methods are likely to vary by country. There is a clear need for further research to identify the price sensitivity of various contraceptive methods on a country-by-country basis to determine the consequences of cost-recovery programs on the pattern of contraceptive method use.

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Appendix Table 5.1. Variables used in analysis: Philippines

Independent variable	Description
PRICE	Cost, in dollars, of one year's supply of each type of contraception
PRICE, SQUARED	Squared cost, in dollars, of one year's supply of each type of contraception
TIME	Time, in minutes, required per year to reach place where each type of contraceptive is obtained
DONATION	1 = respondent gives a donation (in dollars) when receiving a contraceptive method; 0 = no donation
EXPNOMO	1 = respondent desires no more children; 0 = respondent desires more children
MAGE	Respondent's age, in years
AGESQ	Respondent's age, squared
EDUCMOTH	Respondent's years of education
EDUCFATH	Husband's years of education
LIVCHLD	Number of living children
SONS	Number of living sons
URBAN	1 = urban; 0 = nonurban
MANILA	1 = Manila resident; 0 = not Manila resident
CATHOLIC	1 = Catholic; 0 = non-Catholic
KRISTO	1 = religion is Iglesia Ni Kristo; 0 = no
RELIGION	1 = attends religious services often; 0 = no
TAGALA	1 = ethnic group is Tagalog; 0 = no
CEBUANO	1 = ethnic group is Cebuano; 0 = no
STILLAME	1 = still amenorrheic; 0 = no
STILLABS	1 = still abstaining; 0 = no
HUSMODN	1 = husband classifies occupation as professional or clerical (i.e., modern); 0 = no
HUSTRAN	1 = husband classifies occupation as sales, household, or services (i.e., transitional); 0 = no
HUSMIXD	1 = husband classifies occupation as skilled or unskilled; 0 = no

Appendix Table 5.2. Variables used in analysis: Jamaica

Independent variable	Description
PRICE	Cost, in dollars, of one month's protection for each of four available methods (condom, injectable, natural method, and pill)
TIME	Time, in minutes, required per month to travel to source and wait for each method, weighted by household income
EFFECT	Effectiveness of each method (condom = .900, injectable = .998, natural method = .760, pill = .980)
INCOME	Estimated weekly household income, in hundreds of dollars
EDUC	Respondent's educational level (1 = no schooling, 2 = 1-6 years, 3 = 6-9 years, 4 = 10-11 years, 5 = high school diploma, 6 = some college)
AGE	Respondent's age, in years
URBAN	1 = urban residence; 0 = rural
RACE	1 = black; 0 = other
SKILL	1 = respondent is in skilled occupation; 0 = other
PROF	1 = respondent is in professional occupation; 0 = other

Appendix Table 5.3. Variables used in analysis: Thailand

Independent variable	Description
PRICE	Cost, in dollars, of one month's protection for each of six available methods (condom, IUD, injectable, pill, natural method, and sterilization)
TIME	Time, in minutes, required per month to travel to source and wait for each method, weighted by household income
EFFECT	Effectiveness of each method
INCOME	Monthly household income, in dollars
EDUC	Respondent's educational level
AGE	Respondent's age, in years
URBAN	1 = urban residence; 0 = rural
EXEC	1 = executive; 0 = other
BUS	1 = business occupation; 0 = other
SALES	1 = sales occupation; 0 = other
SKILL	1 = skilled occupation; 0 = other

Appendix Table 5.4. Descriptive statistics: Philippines

Independent variable	Mean value	Standard deviation	Minimum	Maximum
Price (condoms)	\$1.220	\$3.680	\$0	\$52.95
Price (IUD)	\$0.120	\$0.370	\$0	\$3.394
Price (pills)	\$0.550	\$1.690	\$0	\$8.146
Time (condoms)	118.975	153.838	12.500	750.000
Time (IUD)	9.934	11.656	0.833	49.995
Time (pills)	48.800	62.750	5.000	300.000
Donation (condoms)	\$0.081	\$0.273	\$0	\$1.000
Donation (IUD)	\$0.110	\$0.313	\$0	\$1.000
Donation (pills)	\$0.147	\$0.354	\$0	\$1.000
Desires no more children	0.598	0.490	0	1.000
Respondent's age	32.880	7.430	15.000	39.000
Respondent's education	8.223	4.129	0	18.000
Husband's education	8.526	4.283	0	20.000
Number of living children	4.098	2.406	0	15.000
Number of living sons	2.084	1.574	0	11.000
Urban residence	0.557	0.497	0	1.000
Manila residence	0.170	0.375	0	1.000
Catholic	0.883	0.322	0	1.000
Kristo	0.020	0.138	0	1.000
Attends religious services	0.475	0.500	0	1.000
Tagala	0.206	0.404	0	1.000
Cebuano	0.294	0.456	0	1.000
Still amenorrheic	0.187	0.390	0	1.000
Still abstaining	0.065	0.246	0	1.000
Husband in modern occupation	0.156	0.363	0	1.000
Husband in transitional occupation	0.168	0.374	0	1.000
Husband in skilled or unskilled occupation	0.338	0.473	0	1.000

Appendix Table 5.5. Descriptive statistics, Jamaica

Independent variable	Mean	Standard deviation	Minimum	Maximum
Price (condom)	\$2.362	\$0.988	\$0.800	\$8.000
Price (injectable)	\$1.728	\$0.973	\$0.033	\$6.667
Price (pill)	\$0.541	\$0.775	\$0.100	\$5.000
Time (condom)	7.111	3.367	3.537	17.058
Time (injectable)	17.632	8.486	5.415	42.457
Time (pill)	22.790	16.021	1.859	92.822
Income (hundreds)	\$1.572	\$0.755	\$0.779	\$3.757
Education	3.731	1.039	2.000	6.000
Age	25.195	5.838	15.000	40.000
Urban	0.689	0.463	0	1.000
Race	0.768	0.422	0	1.000
Skilled occupation	0.372	0.484	0	1.000
Professional occupation	0.068	0.252	0	1.000

Appendix Table 5.6. Descriptive statistics: Thailand

Independent variable	Mean	Standard deviation	Minimum	Maximum
Price (condom)	\$2.224	\$1.085	\$0.286	\$14.286
Price (IUD)	\$0.305	\$0.159	\$0.015	\$2.083
Price (injectable)	\$0.594	\$0.249	\$0.059	\$2.976
Price (pill)	\$0.530	\$0.267	\$0.036	\$2.964
Price (sterilization)	\$0.160	\$0.075	\$0.006	\$0.893
Time (condoms)	57.343	62.848	1.339	658.973
Time (IUD)	7.802	7.937	0.112	78.125
Time (injectable)	39.972	50.656	0.149	580.357
Time (pill)	26.952	38.698	0.298	580.350
Time (sterilization)	0.950	1.937	0.007	35.714
Income	\$201.818	\$210.230	\$17.857	\$2,232.143
Education	3.099	1.797	1.000	8.000
Age	31.903	6.841	15.000	44.000
Urban	0.781	0.419	0	1.000
Executive occupation	0.091	0.271	0	1.000
Business occupation	0.193	0.408	0	1.000
Sales occupation	0.245	0.412	0	1.000
Skilled occupation	0.153	0.361	0	1.000

Appendix Table 5.7A. Estimated coefficients and *t*-statistics for choice of contraceptive methods, multinomial logit regression model applied to exposed women: conditional variables, Philippines

Conditional variable	Coefficient	<i>t</i> -statistic
Price	0.020*	(5.37)
Price squared	-0.001*	(-2.73)
Time cost	-0.001†	(-2.26)
Donation	0.861*	(8.79)

**p* < .01.

†*p* < .05.

Appendix Table 5.8A. Estimated coefficients and *t*-statistics for choice of contraceptive methods, multinomial logit regression model applied to exposed women: conditional variables, Jamaica

Conditional variable	Coefficient	<i>t</i> -statistic
Price	-0.645*	(-4.881)
Time	-0.004	(-0.363)
Effect	47.132*	(5.979)

**p* < .01.

Appendix Table 5.9A. Estimated coefficients and *t*-statistics for choice of contraceptive methods, multinomial logit regression model applied to exposed women: conditional variables, Thailand

Conditional variable	Coefficient	<i>t</i> -statistic
Price	-0.306	(-1.439)
Time	-0.031*	(-5.835)
Effect	3.484	(0.616)

**p* < .01.

Appendix Table 5.7B. Estimated coefficients and *t*-statistics for choice of contraceptive methods, multinomial logit regression model applied to exposed women: unconditional variables, Philippines
(Reference category = no use)

Unconditional variable	Abstinence		Rhythm/ withdrawal		Condom		IUD		Pill	
	Coef.	<i>t</i> -stat.	Coef.	<i>t</i> -stat.	Coef.	<i>t</i> -stat.	Coef.	<i>t</i> -stat.	Coef.	<i>t</i> -stat.
EXPNOMO	1.083*	(4.10)	0.76*	(8.00)	0.659*	(4.26)	1.031*	(5.24)	0.831*	(5.77)
MAGEI	-0.139*	(-4.53)	-0.020*	(-1.66)	-0.133*	(-6.01)	-0.136*	(-6.16)	-0.060*	(-3.08)
AGESQ	0.002*	(3.22)	-0.000†	(-1.99)	0.001†	(2.00)	0.001†	(2.12)	-0.001†	(-2.46)
EDUCMOTH	-0.017	(-0.45)	0.072*	(4.93)	0.053†	(2.29)	0.071*	(2.82)	0.062*	(2.86)
EDUCFATH	-0.018	(-0.46)	0.022	(1.48)	0.045††	(1.89)	0.002	(0.08)	0.028	(1.27)
LIVCHLD	-0.018	(-1.36)	0.010	(0.315)	0.119†	(2.41)	0.077	(1.39)	0.062	(1.23)
SONS	0.082	(0.82)	0.098†	(2.53)	0.025	(0.39)	0.038	(0.55)	0.109††	(1.80)
URBAN	0.020	(0.074)	0.025	(0.25)	0.161	(1.00)	0.711*	(3.88)	0.213	(1.40)
MANILA	0.391	(1.15)	-0.055	(-0.44)	-0.425†	(-2.14)	-0.009	(-1.50)	-0.061	(-0.36)
CATHOLIC	-0.467	(-1.42)	-0.114	(-0.81)	0.078	(0.30)	-0.475†	(-1.99)	-0.177	(-0.84)
KRISTO	-0.253	(-0.37)	-0.438	(-1.37)	-0.669	(-1.02)	-0.046	(-0.10)	-0.081	(-0.19)
RELIGION	0.190	(0.70)	0.203†	(2.25)	0.321†	(2.20)	0.079	(0.48)	0.055	(0.41)
TAGALA	0.383	(1.33)	0.226†	(2.06)	-0.078	(-0.43)	0.068	(0.34)	0.241	(1.56)
CEBUANO	0.491†	(2.08)	0.128	(1.38)	0.075	(0.51)	0.306††	(1.85)	0.004	(0.03)
STILLAME	-0.955*	(-3.17)	-1.231*	(-10.46)	-0.791*	(-4.29)	-2.256*	(-6.83)	-2.917*	(-9.07)
STILLABS	0.967*	(3.07)	-2.740*	(-7.80)	-2.694*	(-4.51)	-1.671*	(-2.75)	-1.729*	(-3.59)
HUSMODN	-0.639	(-1.37)	-0.819	(-0.80)	0.431	(0.16)	0.016	(0.05)	0.134	(0.55)
HUSTRAN	-0.383	(-1.09)	-0.135	(-0.99)	-0.105	(-0.46)	0.139	(0.55)	0.362††	(1.78)
HUSMIXD	-0.603†	(-2.12)	-0.089	(-0.82)	0.216	(1.21)	0.459†	(2.24)	0.183	(1.06)

**p* < .01. †*p* < .05. ††*p* < .10.

Appendix Table 5.8B. Estimated coefficients and *t*-statistics for choice of contraceptive methods, multinomial logit regression model applied to exposed women: unconditional variables: Jamaica
(Reference category = pill)

Unconditional variable	Condom		Injectable		Natural methods	
	Coef.	<i>t</i> -stat.	Coef.	<i>t</i> -stat.	Coef.	<i>t</i> -stat.
INCOME	0.150	(0.476)	-0.653††	(-1.999)	0.450	(1.389)
EDUC	0.638*	(3.201)	-0.706*	(-4.044)	0.754*	(2.994)
AGE	-0.37	(-0.954)	0.018	(0.866)	0.138*	(3.025)
URBAN	-0.868††	(-1.888)	1.799*	(3.590)	-2.57*	(-4.39)
RACE	0.583	(0.996)	-0.183	(-0.464)	-0.063	(-0.115)
SKILL	1.044††	(2.137)	-0.663††	(-1.673)	0.163	(0.284)
PROF	1.853†	(2.010)	1.820†	(2.178)	1.347††	(1.662)

**p* < .01.

†*p* < .05.

††*p* < .10.

Appendix Table 5.9B. Estimated coefficients and *t*-statistics for choice of contraceptive methods, multinomial logit regression model applied to exposed women: unconditional variables, Thailand
(Reference category = pill)

Unconditional variable	Condom		IUD		Injectable		Sterilization		Natural methods	
	Coef.	<i>t</i> -stat.	Coef.	<i>t</i> -stat.	Coef.	<i>t</i> -stat.	Coef.	<i>t</i> -stat.	Coef.	<i>t</i> -stat.
INCOME	0.001	(0.980)	-0.002	(-1.174)	-0.001	(-0.054)	-0.004*	(-3.730)	-0.002	(-1.408)
EDUC	0.289†	(1.968)	-0.044	(-0.254)	-0.142	(-1.242)	-0.314*	(-3.975)	-0.167	(-0.960)
AGE	-0.111*	(-3.360)	-0.078*	(-3.518)	-0.001	(-0.004)	0.022*	(2.682)	-0.057	(-1.534)
URBAN	1.367	(1.459)	0.381	(0.536)	-0.593††	(-1.651)	-0.461	(-1.497)	-0.550	(-0.748)
EXEC	1.069	(0.956)	0.769	(0.676)	-0.230	(-0.211)	2.175*	(3.850)	1.953††	(1.689)
BUS	0.357	(0.421)	-0.428	(-0.487)	-0.125	(-0.211)	1.134*	(3.022)	0.736	(0.739)
SALES	-0.526	(-0.627)	-1.196	(-1.300)	0.216	(0.475)	0.646††	(1.921)	0.719	(0.826)
SKILL	1.219††	(1.674)	-0.160	(-0.178)	1.105†	(2.380)	0.971*	(2.584)	1.589††	(1.852)

**p* < .01.

†*p* < .05.

††*p* < .10.

PART II
METHOD CHOICE
IN ASIA

6 Patterns and Covariates of Contraceptive Method Choice in the Republic of Korea

by Minja Kim Choe and Insook Han Park

The national family planning program is regarded as having been very successful in reducing fertility in the Republic of Korea (Lee-Jay Cho et al. 1982; Nam Hoon Cho et al. 1984). The government provided the first massive family planning program services in 1962 as part of its First Five-Year Economic Plan. Since then, the use of contraceptive methods has increased while the fertility rate has declined dramatically (Figure 6.1). The total fertility rate declined from 6.0 children per woman in 1960 to 2.1 in 1984 (Nam Hoon Cho et al. 1984:table 12; Coale et al. 1980:table 1; KIPH 1985:table III.1; Retherford et al. 1983:table 3), and the prevalence of contraceptive use among currently married women 15–44 years of age rose from 9 percent in 1964 to 70 percent in 1985—an almost eightfold increase in just 20 years (Nam Hoon Cho et al. 1984:table 8; Republic of Korea, BOS, EPB, and KIFP 1977:table 66; KIPH 1985:table V.1; Moon 1973:table III.36).

This chapter first describes the changing patterns of contraceptive use in Korea and methods offered by the government's family planning program over the period of 1960–85, then examines covariates of contraceptive method choice, using data from the Korean Contraceptive Prevalence Survey of 1979. By reviewing the national family planning program and trends in the use of specific contraceptive methods, and by analyzing recent survey data, we hope to shed light on how various factors have affected individual couples' contraceptive behavior in Korea.

CHANGES IN THE PREVALENCE OF CONTRACEPTION

From its initiation in 1962, the Korean national family planning program has operated through the national and provincial health service network under the Ministry of Health and Social Affairs. Modern contraceptive methods became available throughout the country in 1964, when the government hired 1,500 family planning field workers to encourage contraceptive use and deliver supplies. The program focused its efforts on rural areas, where birth rates were traditionally high. Program administrators believed that the needs of urban residents would be met in part by the private sector.

From the outset of the program, the government, with the cooperation of the privately run Planned Parenthood Federation of Korea, organized

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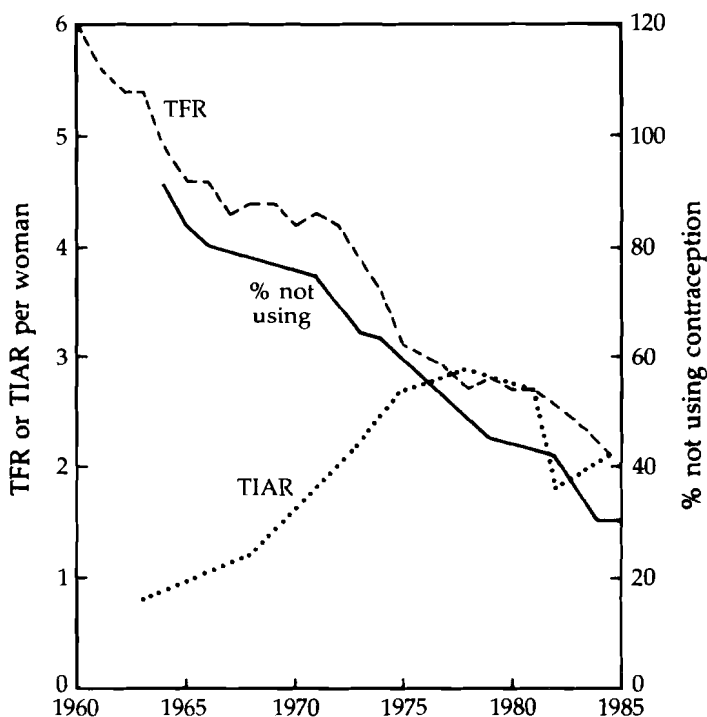


Figure 6.1. Trends in the total fertility rate (TFR), percentage of ever-married women 15-44 years of age not using contraceptives, and total induced abortion rate (TIAR): Republic of Korea, 1960-85

Sources: TFR: Nam Hoon Cho et al. (1984:table 12); Coale et al. (1980:table 1); KIPH (1985:table III.1); Retherford et al. (1983:table 3). Percentage not using: Nam Hoon Cho et al. (1984:table 8); Republic of Korea, BOS, EPB, and KIFP (1977:table 66); KIPH (1985:table V.1); Moon and Choi (1973:table III.36). TIAR: KIPH (1985:table VIII.1); Lim and Song (1984:table 4).

information, education, and communication campaigns to promote the practice of family planning in Korea. Concomitantly, to overcome traditional resistance to small families and modern contraceptive practice, the government encouraged the establishment of Mothers' Clubs in rural areas beginning in 1968. Mothers' Clubs had the advantage of reaching rural women through personal networks (Hyun Jong Park et al. 1974).

Contraceptive use rose quickly after the national family planning program began. The proportion of women using contraceptives more than doubled within two years, from 9 percent in 1964 to 20 percent in 1966. During the next decade, the proportion again more than doubled, reaching 44 percent in 1976. Within the subsequent decade, the prevalence of contraceptive use once more increased dramatically, to 70 percent by 1985.

Survey data also show that in recent years more couples have begun to use modern contraceptive methods in the early stages of family building. Among women with fewer than two children, the proportion using a contraceptive method increased about eightfold between 1965 and 1985, from less than 5 percent to more than 35 percent (Nam Hoon Cho et al. 1984; KIPH 1985).

Contraceptive use was positively related to age, parity, urban residence, and education during the early stages of the program, but in recent years this relationship has become weaker or even reversed (Nam Hoon Cho et al. 1984). For example, in 1965 the proportion of women of reproductive age using any method was 21 percent in urban areas and 14 percent in rural areas (Nam Hoon Cho et al. 1984); by 1985 the proportions had increased to 72 and 68 percent, respectively (KIPH 1985). In 1967 the proportion of women with no formal education who were using contraceptives was 21 percent, whereas 32 percent of women with a high school education were contracepting (Moon et al. 1973; Koh 1980). By 1985 the pattern was reversed: 70 percent of women with no education were using contraceptives, compared with 67 percent of women with a high school education.

CHANGES IN CONTRACEPTIVE METHOD CHOICES

Trends in specific methods used are difficult to estimate accurately owing to lack of comparable data. Pebley et al. (1986) found that retrospective reports of contraceptive use in some Korean surveys were incomplete for some methods. Reports of current use at the time of the surveys, however, were assessed as reliable. Trends in contraceptive method choice we report here are based on the reported proportions currently using various methods at the time of the interviews from several national fertility and family planning surveys.

The methods adopted by surveyed women (Figure 6.2) reflect the availability of particular methods over the years of the national family planning program. When the program started in 1962, condoms, spermicidal foam, and vasectomies were available at nominal fees (Taik Il Kim et al. 1972), and the IUD was introduced soon afterward. Oral contraceptives ("the pill") and tubal ligations were also available through the private sector. In 1966 the most popular method was the IUD, and next in popularity was the condom (Nam Hoon Cho et al. 1984). During the following decade, however, most of the increase in contraceptive use was due to the growing popularity of alternative methods, in particular the pill, sterilization, and "other" methods (e.g., rhythm, foams, and jellies). In 1971 the proportion of women in the reproductive age group who were using IUDs declined from 9 to 7 percent, but pill use rose from 1 to 7 percent (Nam Hoon Cho 1984: table 8).

The IUD was promoted by the government in the early stage of the program, and it was rather favorably accepted, especially in rural areas. Its ad-

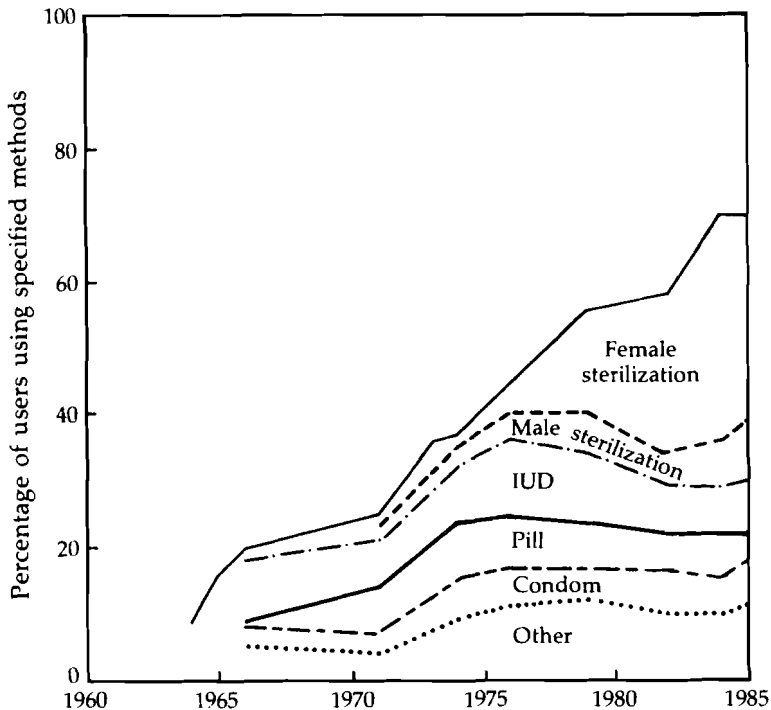


Figure 6.2 Trends in contraceptive method use among currently married women 15-44 years of age: Republic of Korea, 1964-85

Sources: Nam Hoon Cho et al. (1984:table 12); Republic of Korea, BOS, EPB, and KIFP (1977:table 66); KIPH (1985:table V.1); Moon et al. (1973:table III.36).

vantage was that it was simple to administer to less educated women. But many women using the IUD experienced discomfort and unpleasant side effects, with the result that an increasing number of IUD acceptors discontinued this method and requested alternative methods.

Pills were introduced by the program in 1968 and originally offered to women who discontinued the IUD. A year later they became available to all program clients (Taik Il Kim et al. 1972). The data for 1971 indicate a switch from IUDs to pills among previous acceptors and a preference for pills among new acceptors. Use of IUDs, pills, and condoms peaked in the mid-1970s. Thereafter the number of male and female sterilizations rose steadily, and surveys reported increased discontinuation rates for both the IUD and the pill. One survey reported that the discontinuation rate among new IUD users reached 51 percent by the end of the first year of use (Moon

et al. 1973). Another revealed that more than half of pill users stopped using that method within six months in 1980 (Republic of Korea, Ministry of Social Affairs 1983).

Use of female sterilization has increased steadily and markedly since the government program introduced this method in 1972. Before 1972 nearly all sterilizations were vasectomies; but since 1979 female sterilization has been the leading contraceptive method, and by 1985 one-third of all married women of reproductive age had opted for it. The female sterilization rate has increased in both rural and urban areas, and at every age, marital duration, parity, and level of education (Westoff et al. 1980).

A dramatic increase in female sterilizations occurred during 1976-79, from 4 to 15 percent of married women 15-44 years of age. The sudden increase has been attributed to the introduction of laparoscopy into the government program in 1976 and an increase in 1977 in the government's subsidy to physicians for performing it (from US \$10 to \$30). In 1976 the proportion of sterilizations obtained through the private sector exceeded that obtained through the public sector, but by 1978 the respective proportions had been reversed (Westoff et al. 1980).

RECENT CHANGES IN THE USE OF INDUCED ABORTION

Use of induced abortion increased steadily until 1978 and has fluctuated since (Figure 6.1). One study has shown that, at every pregnancy interval, Korean women who used contraceptives were more likely than noncontraceptors to have had an abortion (Donaldson et al. 1982). The report of the 1979 Korea Contraceptive Prevalence Survey shows that, among the pregnancies ended in 1978, 43 percent were terminated by induced abortion, and that, among the latest pregnancies of the respondents, 52 percent were unwanted and 89 percent of the unwanted pregnancies were terminated by induced abortions (Koh et al. 1980).

Although induced abortion was illegal in Korea except for medical or health reasons until 1973, its use has increased steadily and markedly there since 1960. The total marital induced abortion rate, which was .7 per woman in 1963, increased to 1.2 in 1968 and to 2.9 in 1978 (Lim and Song 1984).

The increasing number of induced abortions, despite their illegality, has been explained partly by the demand for abortions that arose during and immediately after the Korean War. Kwon (1982) asserts that induced abortions at that time were sought mainly to terminate unwanted pregnancies or illegitimate pregnancies resulting from forced or unavoidable situations during the period of social unrest, and therefore they were easily accepted by the society.

In addition to the low level of social sanctions against abortion, the cost of induced abortions was so small that it did not prevent even the poor

from obtaining them. The average cost of an abortion in 1971 was US \$7.50, equivalent to three days' wages for unskilled laborers (Hong and Watson 1976).

Various studies indicate that the increased reliance on induced abortion in the 1960s was due partly to the high failure rates of contraceptive methods and a prevailing distrust of them (Sun-Uoong Kim 1980; Ehn Hyun Choe 1980).

Use of induced abortion began to take a downward turn after 1979. Westoff et al. (1980) surmise that the growing reliance upon sterilization after 1976 reduced the number of unwanted pregnancies, of which a large proportion would have been terminated by induced abortion. They estimate that sterilization in 1977-78 averted .84 pregnancies per woman, of which .30 would have resulted in births and .54 would have ended in induced abortions. Their conclusion, therefore, is that the sterilization program has had a major impact in reducing the number of abortions. Studies investigating the effect of induced abortion on the Korean fertility decline (e.g., Kwon 1980; Han 1973) agree that the use of induced abortion was as important as the adoption of contraception in explaining the rapid decline.

COVARIATES OF CONTRACEPTIVE METHOD CHOICE

In the following sections, we examine the covariates of contraceptive method choice using data from the 1979 Korea Contraceptive Prevalence Survey (KCPS). The data from this survey are not as rich in content as those from some earlier surveys, but they reflect the status of contraceptive use at a crucial time. Beginning in the late 1970s, some noticeable changes took place in the pattern of methods used. On one hand, female sterilization began to show a marked increase. On the other, differentials in the prevalence of contraceptive use by such characteristics as urban residence, education, age, and parity began to narrow.

As our brief historical review of the Korean national family program has revealed, the program affected patterns of contraceptive method use. A multivariate analysis of the 1979 KCPS data shows how other factors besides the government program have affected couples' decisions about using particular methods of fertility control.

Data

The KCPS collected data from 13,644 ever-married women of ages 15-49 during March, April, and May 1979 (Koh et al. 1980). The sample was stratified by province. (The island province of Cheju was not included in the original KCPS sample.) To avoid the necessity of using weights for the analysis, the investigators selected random samples from each stratum (province) so that the resulting sample was representative of the whole mainland population. The resulting random sample consisted of 6,481 women.

The KCPS defined current use of contraceptive methods by the question "What kind of contraceptive methods are you using or have you or your spouse used in the last month to avoid pregnancy?" This question was preceded by questions about respondents' knowledge of family planning methods; the questions included prompting about 10 specific methods: pill, condom, IUD, female sterilization, male sterilization, induced abortion, injectable, vaginal methods, rhythm, and withdrawal.

Because our analysis focused on the current use of contraceptives, women who were not in need of contraception at the time of the survey were excluded from our data base. They were self-identified infecund women, women of age 45 or older, those who were pregnant, those who had given birth recently and had not had a menstrual period during the previous 30 days, and women who were not living with their husbands. The remaining sample of 4,063 exposed women was analyzed. About 72 percent of the at-risk women were using some form of contraception at the time of the interview (Table 6.1).

Table 6.1. Contraceptive methods currently used by exposed women: 1979 Korean Contraceptive Prevalence Survey data (unadjusted)

Method	Number of women	%
Female sterilization	746	18
Male sterilization	325	8
IUD	540	13
Pill	382	9
Condom	262	7
Rhythm	397	10
Withdrawal	189	5
Other	68	2
None	1,154	28
All methods	4,063	100

The KCPS listed induced abortion as one of the family planning methods. Without prompting, 22 percent of the at-risk women mentioned induced abortion as a family planning method they knew of, and 75 percent identified it as a family planning method after being prompted. No women, however, identified induced abortion as the family planning method they were currently using.

Method

We used a binary logit model to analyze the covariates of current use of contraceptive methods versus nonuse and a multinomial logit model to analyze the choice of particular methods (see Chapter 15 in this volume). For the estimation of coefficients, we used the maximum likelihood method

for the binary model and the method proposed by Haggstrom (1983) for the multinomial model. For the binary model, the coefficients were estimated by means of the Haggstrom method as well, which showed virtually identical results as those produced by the maximum likelihood method. For the multinomial model, the maximum likelihood method was not practical because of its slow convergence and high computational costs. The covariates included in the analysis consisted of variables measuring respondents' demand for contraception, demographic characteristics, socioeconomic characteristics, experience of and attitudes toward induced abortion, and access to particular contraceptive methods (Table 6.2).

Table 6.2. Means and standard deviations of covariates for choice of contraceptive methods among exposed women: 1979 Korean Contraceptive Prevalence Survey data

Covariate	Mean	S.D.
Want no more children (0 = no, 1 = yes)	0.81	0.39
Want more children later (0 = no, 1 = yes)	0.085	0.28
Last pregnancy unwanted (0 = no, 1 = yes)	0.52	0.50
Number of living sons (0 = 0, 1 = 1, 2 = 2+)	1.42	0.68
Child death (0 = no, 1 = yes)	0.097	0.30
Age (17-44)	33.38	6.05
Residence (0 = rural, 1 = urban)	0.61	0.49
Education (0 = 0, 1 = 1-6, 2 = 7-9, 3 = 10-12, 4 = 13+)	1.63	0.99
Last delivery by professional (0 = no, 1 = yes)	0.31	0.46
Ever had induced abortion (0 = no, 1 = yes)	0.52	0.50
Consider induced abortion as family planning (0 = no, 1 = yes)	0.23	0.42
Number of sources known (1-9)	5.23	1.00
Proportion of government sources among known sources	0.33	0.25
Have used only one method (0 = no, 1 = yes)	0.28	0.45

The demand variables were whether the respondent wanted more children, whether she wanted more children later, and whether the last pregnancy had been wanted. These variables were expected to affect the use of contraceptive methods because they measured the need for contraceptives and for specific methods.

The demographic variables included number of living sons, experience of child mortality, and the woman's age. Studies of Korean women have repeatedly pointed out the positive relationship between number of living sons and the practice of contraception (Arnold 1985; Chai Bin Park 1978,

1983). A positive relationship between the experience of child mortality and fertility has also been observed in Korea (Chai Bin Park 1979). A woman's fecundity and level of sexual activity are related to her age, and therefore we assumed that age would affect the use of contraceptive methods. Older women were exposed to the early phase of the Korean family planning program, whereas younger women have taken advantage of the programs in more recent years. Therefore we expected women's age to be related to the choice of contraceptive methods.

The socioeconomic variables we included in our analysis were urban versus rural residence, level of education, and whether the respondent's last delivery had been attended by a medical professional. These variables we assumed to be related to living arrangements, access to various types of medical facilities, skills required to use some types of contraceptives, and willingness to adopt particular methods.

The access variables included the number of methods known for which the respondent could identify correct sources of supplies, the proportion of government sources among the sources known, and whether the respondent's current method was her first method. We expected that women who were aware of more sources of contraceptive methods were more likely than others to become users. Because the government program supports selected methods of contraceptives, the proportion of government sources known, we hypothesized, would have an effect on the choice of methods. The variable indicating whether the current method was the first method was not really an access variable. We included it in the model because switching of methods has been observed to be prevalent in Korea. Including this covariate in the model would show if particular methods were preferred as the first method.

We were also interested in learning whether respondents had ever had an induced abortion and whether they mentioned, without prompting, induced abortion as a family planning method. Because much of Korea's fertility decline has been attributed to induced abortions, we wanted to investigate the interaction between the use of induced abortion and the use of contraceptives.

Our choice of covariates was somewhat arbitrary owing to the limitations of the data. Furthermore, for some of the covariates, reverse causation cannot be ruled out; but the statistical method we chose does not provide the adjustment for reverse causation.

RESULTS

Users versus Nonusers

The first column of Table 6.3 shows binary logit regression coefficients for use versus nonuse. All the demand variables proved to be significant covar-

Table 6.3. Estimated coefficients and *t*-statistics for choice of contraceptive methods: binary multinomial logit regression model applied to exposed women: 1979 Korean Contraceptive Prevalence Survey data
(Reference category = no use)

Covariate	Any method	Pill	Condom	IUD	Female sterilization	Male sterilization	Rhythm	Withdrawal	Other
Want no more children	4.74 (30.02)	4.74 (17.99)	4.72 (15.60)	4.79 (20.18)	5.05 (23.08)	5.07 (18.02)	4.67 (17.90)	4.61 (13.31)	4.83 (8.96)
Want more children later	3.10 (15.42)	3.48 (11.31)	4.11 (11.76)	3.06 (10.95)	2.55 (9.73)	2.40 (7.23)	3.09 (10.13)	2.96 (7.38)	3.63 (5.87)
Last pregnancy unwanted	.548 (4.99)	.786 (4.72)	.954 (5.04)	.503 (3.32)	.523 (3.69)	.151 (0.85)	.692 (4.20)	.728 (3.38)	1.27 (3.85)
Living sons	.181 (2.46)	.0685 (0.62)	.0743 (0.59)	.244 (2.42)	.366 (3.89)	.330 (2.79)	.0280 (0.26)	.0212 (0.15)	.0287 (0.13)
Child death	-.114 (-0.76)	.0438 (0.19)	-.0982 (-0.38)	-.243 (-1.18)	-.221 (-1.15)	-.346 (-1.43)	-.166 (-0.74)	.507 (1.74)	.246 (0.55)
Age	.541 (6.75)	.529 (4.35)	.650 (4.70)	.449 (4.06)	.905 (8.82)	.510 (3.93)	.462 (3.84)	.420 (2.67)	.181 (0.75)
Age ² /100	-.773 (-6.50)	-.827 (-4.58)	-.976 (-4.76)	-.618 (-3.77)	-1.33 (-8.74)	-.678 (-3.51)	-.607 (-3.39)	-.537 (-2.30)	-.236 (-0.66)
Residence	-.596 (-2.99)	-.554 (-1.84)	-.612 (-1.79)	-1.32 (-4.82)	-.226 (-0.88)	.122 (0.38)	-.969 (-3.25)	-.138 (-0.35)	-.911 (-1.52)
Education	.0276 (0.29)	-.0940 (-0.65)	.0357 (0.22)	-.128 (-0.96)	.090 (0.73)	.539 (3.48)	.0724 (0.50)	.167 (0.89)	-.109 (-0.38)

Residence × Education	.125 (1.16)	.154 (0.95)	.534 (2.89)	.218 (1.48)	-.00275 (-0.00)	-.220 (-1.27)	.274 (1.70)	-.203 (-0.97)	.214 (0.66)
Professional at last delivery	.121 (1.09)	-.139 (-0.83)	.212 (1.11)	-.214 (-1.40)	.359 (2.52)	.319 (1.78)	.0865 (0.52)	-.187 (-0.86)	.871 (2.61)
Ever had induced abortion	.0528 (0.33)	.644 (2.69)	.405 (1.49)	-.264 (-1.22)	.212 (1.04)	-.0979 (-0.38)	-.0145 (-0.06)	.744 (2.41)	-.215 (-0.45)
Induced abortion × residence	.458 (2.58)	.0759 (0.28)	-.0137 (-0.05)	.595 (2.44)	.420 (1.84)	.651 (2.27)	.757 (2.86)	.0623 (0.18)	1.58 (2.96)
Induced abortion as family planning	-.238 (-2.21)	-.419 (-2.59)	-.243 (-1.32)	-.112 (-0.76)	-.198 (-1.44)	-.291 (-1.68)	-.0927 (-0.58)	-.243 (-1.16)	-.317 (-0.98)
Number of sources known	.201 (4.44)	.155 (2.28)	.279 (3.61)	.182 (2.95)	.145 (2.51)	.190 (2.62)	.328 (4.87)	.290 (3.30)	.179 (1.32)
Proportion of government sources	.108 (0.55)	.645 (2.16)	-.375 (-1.10)	.640 (2.36)	-.103 (-0.41)	-.032 (-0.10)	-.244 (-0.83)	.360 (0.94)	-.197 (-0.33)
First method	na na	1.53 (10.34)	.587 (3.46)	1.14 (8.45)	.462 (3.64)	.649 (4.07)	.621 (4.20)	.529 (2.74)	-.101 (-0.34)

na—not applicable.

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iates for the use of contraceptive methods compared with nonuse. Among the demographic variables, child mortality was not a significant covariate. Number of living sons was a significant covariate and the relationship with age assumed a bell shape, peaking at age 35. Among socioeconomic variables, residence was a significant covariate. Rural women were more likely to be contraceptive users than were urban women after we adjusted the data for other covariates. Education was not a significant covariate for the rural women. But combining the coefficients for residence and the interaction between residence and education shows that education was a strong coefficient for urban women, although it is not possible to say whether the combined effect was statistically significant. A separate analysis of urban women, not presented here, revealed that education was indeed a significant covariate, as shown by another study of the same data (Chai Bin Park et al. 1983). Whether rural women experienced induced abortion did not significantly affect their current use of contraceptives. Among urban women, however, those who had had an induced abortion were more likely than other women to be contraceptive users. Women who considered induced abortion to be a family planning method were less likely to be using contraceptives. Women who knew of more sources of contraceptives were likely to be users, but whether those sources were government or private sources did not affect use.

Choice of Methods

Columns 2 through 9 of Table 6.3 show the multinomial logit coefficients for the choice of contraceptive methods, with nonuse as the alternative outcome. Table 6.4 shows the significance and directions of multinomial logit coefficients for all possible comparisons of method choice. Table 6.5 presents the multinomial logit results by showing the proportions of women using each method computed by the model for selected groups of women.

Whether a woman wanted more children or not was a very strong and statistically significant covariate for using all methods versus using no method, as expected. But it was not a significant covariate for choosing any particular method over some other methods. This interesting finding may result from the fact that most Korean women use contraceptive methods to stop childbearing and only a small proportion of women use it for spacing purposes. In contrast, but also as expected, whether a woman wanted to have more children later significantly affected her decision to use some methods rather than others. Specifically, respondents wanting more children later preferred pills to female and male sterilization, and condoms to sterilization, the IUD, rhythm, and withdrawal. An interesting result is that they preferred the condom to rhythm and withdrawal. The experience of unwanted pregnancy was a significant covariate for all methods over none, except for male sterilization. Users of male sterilization had had significantly

fewer unwanted pregnancies than had nonusers and users of other methods. Users of the IUD and female sterilization also had had fewer unwanted pregnancies than had condom users.

Number of living sons was a significant covariate for choosing permanent methods (female and male sterilization) and the IUD over none. It was also a significant covariate for choosing female and male sterilization over the pill and female sterilization over the condom. Even after we adjusted for other covariates in the model, including whether respondents wanted more children, the number of living sons was a significant covariate for terminating family building in Korea.

The experience of having a child die was a significant covariate for choosing withdrawal over the IUD and female or male sterilization. Otherwise, it was not a significant covariate for other contrasts, including use of any methods over none.

Age was a significant factor for all methods over none, except for the "other" methods. It was also significant for choosing female sterilization over all other methods except the condom. Older women were more likely to be users and to have chosen sterilization. These curvilinear relationships can be explained partly by the reduced fecundity of women as they age and partly by changes in the Korean family planning program. It is difficult to separate the two effects in our data.

The effects of the socioeconomic variables on the choice of contraceptive methods proved to be quite complex. Some of the most interesting relationships are noted here. Rural women preferred the IUD and rhythm, whereas urban women preferred sterilization (male or female), the pill, and withdrawal. More-educated couples were more likely than others to be using contraceptives, especially the male methods. Women who had been assisted by a professional at their last delivery had in many cases chosen female sterilization.

The experience of induced abortion was a significant covariate for choosing the pill or withdrawal. Whether a woman considered induced abortion to be a family planning method significantly affected her choice of no method over the pill. This interesting result suggests that the availability of induced abortion may affect the adoption of certain contraceptive methods.

The number of contraceptive sources respondents knew about was a significant covariate for choosing all methods except the "other" methods over no method, and for choosing rhythm over the pill, IUD, and female sterilization. Women who were aware of more government sources tended to choose the pill and the IUD over other methods, especially the pill. Thus, access to any source of contraceptive methods, regardless of the type of sources, encouraged couples to become users. The type of known source did affect the choice of contraceptive methods, however. The number of

Table 6.4. Direction and significance of multinomial logit regression co-Korean Contraceptive Prevalence Survey, 1979

Method choice	Want no more children	Want children later	Last pregnancy unwanted	Have living sons	Had child death	Age	Age ²	Residence
Pill vs. none	+++	+++	+++			+++		
Condom vs. none	+++	+++	+++			+++	---	
IUD vs. none	+++	+++	+++	+		+++	---	---
Female sterilization vs. none	+++	+++	+++	+++		+++	---	
Male sterilization vs. none	+++	+++		++		+++	---	
Rhythm vs. none	+++	+++	+++			+++	---	-
Withdrawal vs. none	+++	+++	+++			++	---	
Other vs. none	+++	+++	+++					-
Condom vs. pill								
IUD vs. pill								-
Female sterilization vs. pill		--		++		++		
Male sterilization vs. pill		--	--	+			--	
Rhythm vs. pill								
Withdrawal vs. pill								
Other vs. pill								
IUD vs. condom		--	-					
Female sterilization vs. condom		---	-	+				
Male sterilization vs. condom		---	---					
Rhythm vs. condom		--						
Withdrawal vs. condom		-						
Other vs. condom								
Female sterilization vs. IUD						+++		
Male sterilization vs. IUD							---	+++
Rhythm vs. IUD								
Withdrawal vs. IUD					+			++
Other vs. IUD			+					
Male sterilization vs. female sterilization			-			--		

efficients for all possible comparisons of contraceptive method choices:

Covariate								
Education	Residence × education	Professional delivery	Ever had induced abortion	Induced abortion × residence	Induced abortion as family planning	Number of known sources	Proportion of government sources among known sources	First method
			++		--	+	+	+++
	++					+++		+++
				+		++	+	+++
		+				+		+++
+++				+		++		+++
				++		+++		+++
			+			+++		++
		++		++				
			---				--	---
		++					-	---
+++		+	--					---
			-	+		+	--	---
		++		++				---
		-	-				++	++
	--							
++	---			+				
	--			++				
		+++	+				--	---
+++	-	++					-	---
						+	--	---
			++					--
		++						---
++								

Table 6.4 (continued)

Method choice	Want no more children	Want children later	Last pregnancy unwanted	Have living sons	Had child death	Age	Age ²	Residence
Rhythm vs. female sterilization				--		---	+++	-
Withdrawal vs. female sterilization				-	+	--	+++	
Other vs. female sterilization			+			-	+++	
Rhythm vs. male sterilization			++	-			++	--
Withdrawal vs. male sterilization			+		++			
Other vs. male sterilization			++					
Withdrawal vs. rhythm								+
Other vs. rhythm								
Other vs. withdrawal								

Note: An empty cell indicates that relationship is statistically not significant.

+ = positive relationship, $p < .05$.

++ = positive relationship, $p < .01$.

+++ = positive relationship, $p < .001$.

Similarly for the negative signs.

known sources also affected the use of methods not requiring supplies, such as rhythm and withdrawal. One possible explanation is that the sources were important not only in providing supplies but also in promoting contraceptive use.

Women who had ever used only one method had chosen the pill over all other methods. Many also preferred the IUD and male sterilization. For many, the first method had been obtained from a government source, and many couples began using contraceptives for the first time when they wanted no more children.

CONCLUSION

The review of historical data and the analysis of the 1979 survey data show that both the adoption of contraception and the choice of method were affected by the degree and type of access Korean couples had to contraceptive methods. Access affected the use of nonsupply methods such as rhythm

Covariate								
Education	Residence × education	Professional delivery	Ever had induced abortion	Induced abortion × residence	Induced abortion as family planning	Number of known sources	Proportion of government sources among known sources	First method
						++		
		-						
				+				
--	--							
		-	+					
-								-
	-		+					
		+						
		+		+				

and withdrawal as well. It seems that sources—of contraceptive services and information—play important roles in motivation. The Korean family planning program, with its willingness and ability to propagandize instead of passively waiting for clients, has achieved more than delivering contraceptive supplies to couples. The program's emphasis on reaching rural couples may be responsible for the findings that, when other factors were controlled, rural women were more likely than urban women to adopt contraceptives and that educational differences had no effect on adoption among rural women. Among urban women, in contrast, the less educated had a significantly lower level of adoption. Future family planning programs in Korea need to pay particular attention to this group of women.

The importance of access as a factor in the choice of one method versus another is less clear, but there are at least two indications that access may also be important here. First is the association we found between choosing female sterilization and having had a medical attendant at the last delivery. Having medical personnel present at deliveries gives women access to information about sterilization. Second is the association between rural residence and use of the IUD. As we noted earlier, the national program began with a rural focus and initially emphasized the IUD, thus providing women with greater access to IUDs in rural areas.

Table 6.5. Expected proportions of women using each method, by selected characteristics of the women: Republic of Korea, 1979

Characteristic	No method	Pill	Condom	IUD	Female sterilization	Male sterilization	Rhythm	Withdrawal	Other
All women	.2031	.1068	.0676	.1464	.2055	.0861	.1185	.0503	.0157
Want more children now	.9429	.0079	.0049	.0109	.0129	.0054	.0097	.0044	.0011
Want more children later	.4114	.1124	.1292	.1017	.0722	.0258	.0928	.0367	.0176
Want no more children	.0917	.1193	.0752	.1648	.2435	.1024	.1306	.0548	.0178
Last pregnancy	.2577	.0898	.0521	.1428	.1983	.1009	.1047	.0436	.0102
Last pregnancy wanted	.2482	.1184	.0744	.1265	.1493	.0658	.1392	.0597	.0184
Have no sons	.2482	.1184	.0744	.1265	.1493	.0658	.1392	.0597	.0184
Have one son	.2165	.1106	.0699	.1408	.1878	.0799	.1249	.0532	.0165
Have two or more sons	.1848	.1011	.0642	.1534	.2312	.0948	.1096	.0463	.0145
Child death	.2193	.1199	.0668	.1269	.1818	.0680	.1102	.0859	.0211
No child death	.2010	.1052	.0676	.1484	.2079	.0881	.1192	.0474	.0151
Age = 25	.2931	.1419	.0716	.1267	.1656	.0611	.0867	.0363	.0171
Age = 30	.1819	.1275	.0780	.1356	.2439	.0753	.1021	.0419	.0137
Age = 35	.1539	.1032	.0712	.1451	.2515	.0902	.1210	.0505	.0134
Urban, high education, induced abortion	.1358	.0954	.1189	.0946	.2070	.1237	.1601	.0411	.0234
Urban, high education, no induced abortion	.2218	.0759	.1313	.1110	.1796	.1162	.1243	.0300	.0098
Urban, low education, induced abortion	.1890	.1177	.0530	.1098	.2404	.0909	.1115	.0614	.0264
Urban, low education, no induced abortion	.3008	.0912	.0570	.1255	.2033	.0832	.0844	.0436	.0108

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Rural, high education, induced abortion	.1628	.1161	.0537	.1212	.2042	.1324	.1043	.0976	.0076
Rural, high education, no induced abortion	.1829	.0685	.0403	.1772	.1855	.1640	.1189	.0521	.0106
Rural, low education, induced abortion	.1820	.1566	.0559	.1749	.1907	.0503	.1009	.0781	.0106
Rural, low education, no induced abortion	.2041	.0923	.0418	.2554	.1730	.0623	.1148	.0416	.0147
Professional at last delivery	.1891	.0903	.0729	.1176	.2452	.0999	.1171	.0412	.0266
Professional not at last delivery	.2079	.1141	.0648	.1601	.1883	.0799	.1181	.0567	.0123
Induced abortion mentioned as family planning	.2305	.0879	.0637	.1526	.2004	.0782	.1253	.0474	.0140
Induced abortion not men- tioned as family planning	.1950	.1131	.0687	.1443	.2067	.0885	.1163	.0511	.0162
No. of sources known = 1	.3835	.0998	.0361	.1211	.2011	.0689	.0508	.0255	.0132
No. of sources known = 6	.1877	.1062	.0713	.1475	.2034	.0870	.1278	.0533	.0158
Proportion of government sources among known sources = .25	.2085	.0885	.0786	.1216	.2184	.0894	.1319	.0459	.0172
Proportion of government sources among known sources = .75	.2085	.0888	.0784	.1220	.2182	.0893	.1317	.0459	.0172
Tried only one method	.1230	.1929	.0623	.2003	.1732	.0830	.1119	.0445	.0088
Tried more than one method	.2402	.0817	.0677	.1251	.2131	.0846	.1174	.0512	.0191

Note: For all covariates except the one labeled in a particular row, mean values were substituted in the model.

Women who wanted to stop childbearing chose sterilization, whereas those who wanted to have more children later preferred the pill. The more-educated spacers in urban areas preferred either the pill or the condom. Besides sterilization and the IUD, rhythm and withdrawal seemed to be used as "terminal" methods. Couples who used rhythm and withdrawal had characteristics similar to those who used sterilization and the IUD. Perhaps only couples having a strong commitment to preventing further pregnancies are willing to exercise the effort and cooperation required.

Users of rhythm showed other interesting characteristics. They knew of more sources of contraceptive methods than did users of sterilization, the pill, or the IUD, which are the government methods. This finding leads us to wonder whether the users of rhythm had tried other government methods and switched to rhythm after experiencing problems. Another possibility is that the government program has been successful in encouraging the adoption of its contraceptive methods, but less successful in maintaining the continued use of those methods. Further research on these questions should provide policy-relevant findings.

Another notable result was the association between choice of the pill and the experience of and attitude toward induced abortion. Pill users were likely to have had an induced abortion and to consider induced abortion as a method of family planning. Withdrawal was also associated with the experience of induced abortion, but not with attitude toward induced abortion.

Finally, we observed an interesting pattern of male sterilization. Users of male sterilization had more education and fewer unwanted pregnancies than other method users. Perhaps this finding indicates higher competence and stronger motivation to practice contraception among couples who accept male sterilization.

In summary, the findings point to the importance of certain types of access in determining the adoption and choice of contraceptive methods, such as having medical personnel at deliveries who can also perform sterilization. Access itself is not the main factor, however; promotion of contraceptive methods through supply centers and other groups is also very important, because even methods that require no supplies are affected by accessibility. Given access and information, limiters and spacers choose different methods, as do individual couples having different personal preferences. For example, both the pill and the condom are used as temporary methods.

Trends in Korean contraceptive use showed a marked increase in female sterilization after 1979, whereas IUD use decreased and all other methods remained at about the same levels of use. The analysis of 1979 data presented here indicates that the adjusted proportion of women using contraceptives among those who wanted no more children was 91 percent (Table 6.5),

nearly the maximum level. The dramatic increase in female sterilization after 1979 must have been due to a greater need to terminate fertility as younger women with smaller-family norms finished their family building. The steady level of temporary-method use implies that more women were using contraceptives for spacing purposes. This influence is supported by the high use rate of contraceptives among women of parities zero and one reported in a more recent survey (Nam Hoon Cho et al. 1984).

Some important questions remain unanswered. Our analysis, which is based on the method of current use, does not provide enough information on the interrelationships among the initial adoption of contraceptive use, discontinuation or failure, switching of methods, and use of induced abortion. Another aspect requiring further analysis is the use of contraceptives for spacing purposes. The fertility of the Korean population at present is nearly at the replacement level, but a large cohort of women is in the child-bearing ages. The government recently adopted a policy of encouraging one-child families to promote a further reduction of population growth (Nam Hoon Cho et al. 1984). An alternative policy having the same goal of reducing the population growth rate in the immediate future would be to promote delayed childbearing (Bongaarts and Greenhalgh 1985). The analysis presented here suggests that the contraceptive needs of Korean couples who want no more children are being met adequately by sterilization. Whether the needs of those who want to postpone births are being adequately met is an important question still to be answered, for more couples are expected to opt for delayed family formation in the future.

7 Determinants of Contraceptive Method Choice in Peninsular Malaysia, 1961-75

*by Julie DaVanzo, Tan Boon Ann,
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Fertility rates have fallen dramatically in Malaysia since World War II. The total fertility rate dropped from 619 births per thousand women in 1955 to 416 in 1975 (Hirschman and Fernandez 1980). National family planning efforts have been under way since the mid-1960s; and rates of contraceptive use, especially of modern methods, have increased dramatically since then—contributing substantially to Malaysia's fertility decline (DaVanzo and Haaga 1982).

This chapter documents the trend in contraceptive method use in Peninsular Malaysia over the period 1961-75 among women 35 years of age or younger and examines the influences on their method choices. Using data from the Malaysian Family Life Survey (Butz and DaVanzo 1978), we assess the extent to which family planning clinics and socioeconomic variables contributed to increased use of contraceptives in general, and of modern methods in particular. The following sections describe the data, discuss changes in the contraceptive methods used over the period, and present a multivariate analysis of influences on contraceptive method choice. The final section summarizes the findings and discusses their implications.

DATA

The 1976-77 Malaysian Family Life Survey (MFLS) was a population-based, retrospective, longitudinal survey consisting of three rounds, conducted four months apart beginning in August 1976. The probability sample consisted of randomly selected private households containing at least one ever-married woman 50 years old or younger at the time of the initial visit. A total of 1,262 households (88 percent of the eligible probability sample) completed Round 1 of the survey. The households were located in 52 primary sampling areas in Peninsular Malaysia, of which 49 were randomly selected; the other three were purposely selected to give additional representation to Indian households and households in fishing communities.

The key questionnaire for the present analysis was the Round 1 Female Retrospective Life History Questionnaire, which elicited a complete history of each woman's pregnancies and related events. The data document the date and type of each pregnancy outcome, whether contraception was practiced in the interval that followed it, and, if so, which method was used

and for how long. (If more than one method was used, the data document the two methods used longest and the total duration of contraceptive practice in the interval. For details, see the appendix in DaVanzo et al. 1986.) The data also document, for each interval, the duration of postpartum amenorrhea, whether a child died in the interval, correlates of household income (from which we created a retrospective income measure), and the woman's age and the date at the beginning of the interval. For each woman's first and most recent birth, they document whether the child was born in a hospital. The woman's education, her ethnicity, and the number of children she would choose to have were she to begin her married life again were also recorded. Community data provide information on family planning clinics in or near her community, including their distance from the community and the approximate date when they began operations.

Haaga (1986) has extensively investigated the quality of the MFLS data on pregnancies and related life events by comparing statistics based on the MFLS sample with those from Malaysian vital statistics, censuses, and other surveys, and by assessing the internal consistency of the MFLS information itself. His analysis suggests that the data accurately report women's ages and levels of education. He found no evidence of underreporting of births, nor of underreported girls or babies who had subsequently died. Findings from the MFLS about ever-use of modern contraceptives by ever-married women 15-34 years old as of 1967 were similar to those from the West Malaysian Family Survey fielded in that year.

As the MFLS was a random sample of women in their childbearing years in 1976, it provided a random sample of births at that time. It did not, however, provide a random sample of births in earlier years. The upper age limit of 50 for women in the sample meant that the survey could not document the experiences of women in the older reproductive age groups in earlier years. (The oldest women in the sample would have been 35 years old in 1961.)

Because contraceptive use varies with age, it is important to consider the same age range of women in each calendar year in order not to confound age and time-period effects. A tradeoff exists, however, between the age range (and hence the number of women) that can be considered and the number of years into the past that women of these ages can be followed. Here we consider contraceptive use patterns over the period 1961-76 among women who were 35 or younger during those years. The period is long enough to include the major increases in contraceptive use rates that occurred in Malaysia prior to the MFLS, yet the age range is broad enough to include the majority of contraceptive users.¹

1. Data from the Malaysian Fertility and Family Survey (Malaysia's version of the World Fertility Survey, conducted in 1974) show that women over age 35 were the slowest to adopt contraception. Fewer of them than of women 25-34 had ever used modern contraception (Chander et al. 1977). Furthermore, MFLS data show, for all three major ethnic groups, increases over time in contraceptive use following even first births (DaVanzo and Haaga 1982).

TRENDS IN METHOD CHOICE DURING 1961-75

Figure 7.1 shows, for each year during the period 1961-75, the average percentage of the time that couples who were otherwise at risk of pregnancy (i.e., married but not pregnant or amenorrheic) practiced various contraceptive methods. The proportion of time protected by contraception rose from 11 to 47 percent over the 15 years. The largest increases occurred for the pill (from nearly 1 to nearly 26 percent), female sterilization (from nearly zero to 7 percent), and the condom (from less than 1 to 4 percent). By contrast, use of the traditional methods of abstinence, withdrawal, folk methods, and "other" methods did not increase or even declined over the period. Hence, the sizable increase in contraceptive practice was due entirely to modern methods, especially the pill and female sterilization. By 1975, the pill was the most common contraceptive method used by Malaysian women, representing 55 percent (26 percent divided by 47 percent) of the total time protected by contraception that year. Sterilization (female and male) was second, providing 15 percent of the protected time. It was followed by the condom, rhythm, abstinence, and folk methods. Use of vasectomy, the IUD, injectables, other female methods (foams, jellies, etc.), and withdrawal was rare in Malaysia in this period, with rates not exceeding 1 percent. The low rate of IUD use is typical of Islamic countries and reflects the fact that the Malaysian family planning program has not actively promoted this method.

CONCEPTUAL FRAMEWORK FOR THE MULTIVARIATE ANALYSES

Contraception may be practiced either to space births or limit their number. Couples will be interested in practicing some form of contraception if they wish to reduce the likelihood of conception below what they believe that likelihood would be in the absence of contraception, and if they perceive the benefits of doing so to exceed the costs. Hence, the likelihood of practicing contraception depends in part on couples' perceptions of their fecundity. The benefit they perceive of reducing the probability of conception depends on the costs of having a child at the time under consideration and of raising it, compared with the benefits. The costs of fertility regulation include monetary, time, and psychic costs and will be influenced by couples' knowledge and attitudes about contraceptive methods and the availability of those methods. The couples' choices among the methods they are aware of will be influenced by the same considerations—that is, the value of delaying or preventing a birth, the perceived effectiveness of each method, and its perceived costs.

This framework is similar to that underlying the work of the National Academy of Sciences Panel on Fertility Determinants (Bulatao and Lee 1983), which draws on the synthesis framework of Easterlin (1978). The frame-

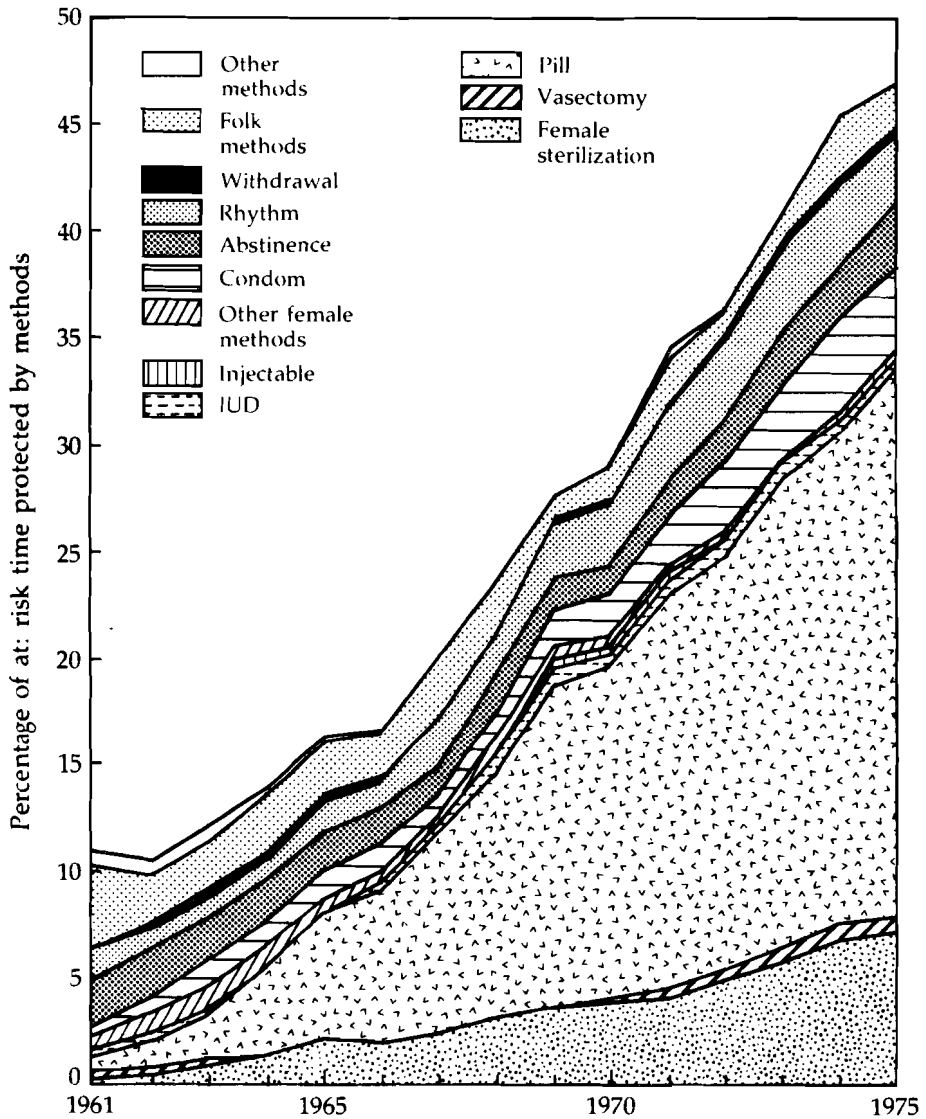


Figure 7.1. Trends in contraceptive use and method mix among women 35 years of age or younger: Peninsular Malaysia, 1961-75

Source: DaVanzo et al. (1986:appendix).

work views the motivation to practice contraception as determined by the difference between the supply of and demand for children, and contraceptive use as determined by motivation and the costs of fertility regulation. Hence, the demand for contraception is a derived demand, derived from the demand for a particular probability of conception, but it is conditioned by the "price" of contraceptive practice (Michael and Willis 1975).

Postpartum amenorrhea. In many less developed countries, breastfeeding is an important form of contraception (Rosa 1975; Habicht et al. 1985), and many women appear to be aware of its contraceptive effect. The majority of women in the MFLS sample, for example, were aware that it was more difficult to become pregnant while breastfeeding (DaVanzo 1980). Hence, one could view breastfeeding as a form of contraception in this conceptual model, while giving due consideration to the nutritional grounds for its practice. We focus here, however, on contraceptive use after the resumption of postpartum menstruation, since this is the form of contraception most likely to be directly affected by family planning programs. Nevertheless, we have assessed how the duration of postpartum amenorrhea at the beginning of a pregnancy interval affected subsequent contraceptive practice in the interval. For a given desired interval length, the more of the interval that was taken up by postpartum amenorrhea, the less was the need to extend the menstruating interval through contraceptive practice.

Besides the duration of postpartum amenorrhea, the multivariate analysis considered the following influences on contraceptive use:

Whether a couple had reached its family-size goal or how far it was from achieving that goal. This variable, which measures the strength of the couple's motivation to practice fertility regulation, was derived from respondents' replies to a question about the number of children they would choose to have were they to begin their married life again. Assuming that couples had not drastically revised their fertility goals over time, we used this response to create retrospective measures of their fertility preferences at various times in the past, which we then matched with the retrospective data on their contraceptive use during those times. Specifically, we created a variable indicating whether, at the beginning of each interval, a respondent desired more children.²

Desired family size may be endogenous to decisions about contraception because the costs of fertility control, as well as the costs of children, may influence the effective demand for children (Michael and Willis 1975; Paqueo et al. 1985). Excluding the variable indicating that no more children were desired did not notably affect any of our other results.

2. In our preliminary analyses we experimented with a continuous measure of the number of additional children desired per remaining fecund time, but it was not significantly related to contraceptive use when we also included the dummy variable indicating that no more children were desired.

Education of the wife. This variable should be related to women's awareness of contraceptive methods (including their effectiveness and side effects) and related also to women's receptivity to newer technologies (Welch 1970; Michael 1973; Schultz 1975).

Family income. This variable measures a couple's ability to afford the monetary costs of contraceptive methods that have such costs attached to them.

Whether a child in the family had died recently. Parents may try to replace a child who has died by having another birth sooner than they otherwise would have. (This effect is in addition to the effect of curtailed breastfeeding, which shortens the duration of postpartum amenorrhea.)

Birthplace of a child born at the beginning of the interval. Women who give birth in hospitals may receive advice about contraception from physicians or nurses there. Some of the family planning programs in Malaysia include such a hospital-based component.

Mother's age. Couples should be less likely to practice effective contraception when their fecundity is low, i.e., at the extremes of maternal age. They should be least likely to practice abstinence early in a marriage, when coital frequency tends to be greatest.

Availability of family planning services. Whether a family planning clinic is nearby should affect a couple's information about family planning and both the time and money costs of fertility control. We also consider two interactions of clinic availability—with women's education, which would enable us to examine whether the establishment of a family planning clinic reduced educational differentials in contraceptive use, and with the desire for another child, which would show whether clinics were more effective in promoting contraceptive use among women who wished to stop childbearing or more effective instead in promoting contraception for the purpose of spacing births.

Other factors. Such factors as ethnicity and rural residence may affect attitudes and norms regarding fertility regulation. The date (year) may coincide with other unobserved factors influencing such norms and attitudes or information about family planning. These factors may have had an independent effect even when the influences of other factors already listed are controlled.

All explanatory variables used in our analyses refer to the time of the interpregnancy interval under consideration.

METHODOLOGY

Using an ordinary least squares approximation (described in Haggstrom 1983 and in Chapter 15 of this volume), we estimated a multinomial logit regression equation explaining the choices among six contraceptive methods—sterilization (vasectomy or tubal ligation), pill, condom, abstinence, rhythm, folk methods (typically massages or herbs that may have

abortifacient effects)—vis-à-vis the choice not to practice contraception. As seen in Figure 7.1, these were the main methods used by couples in Malaysia. We also estimated a summary logit equation explaining whether contraception (of any type except breastfeeding) was practiced in a particular interval.

If a couple practiced more than one contraceptive method in the interval, we categorized the interval according to the one they used longest. For 133 of the intervals in which more than one method other than breastfeeding was used, the method used longest was not one of the six considered here, but the second method was; those intervals were categorized according to the methods used second longest. In addition, we excluded from the choice-of-method analysis 48 intervals in which contraception was practiced but methods other than one of the major six was used. The majority of those were traditional methods (withdrawal or "other").

The sample for both analyses consisted of all at-risk interpregnancy intervals that began between 1961 and 1976 among women of age 35 or younger at the beginning of the at-risk interval. (We excluded the interval between marriage and first pregnancy because the level of contraceptive use before the first pregnancy was very low during this period (DaVanzo and Haaga 1982.) We considered both open and closed intervals, but excluded those in which the woman was still amenorrheic at the time of the survey or had resumed menstruation within a month or less of the survey date, or in which the length of complete separation from her spouse equaled the entire length of the menstruating interval.³ We assumed that each time a woman becomes at risk of pregnancy again (after the previous pregnancy outcome), she decides whether to practice contraception in that interval, and with what method. Hence, intervals were our units of observation.

As a result, there is frequently more than one observation per woman, which creates the possibility that influences on contraceptive use in different intervals for the same woman may be correlated. (Another implication of using pregnancy intervals as the units of analysis was that sterilization and other effective methods show up in lower proportions than if women were the units of analysis.) We used a variance-components estimation technique that allowed for nonhomogeneous correlation among the observations for each woman, and have adjusted the standard errors and the *t*-statistics accordingly. The intragroup correlation (correlation among residu-

3. Open intervals (that is, those beginning after the most recent birth) were included because many of them were long and represented effective contraceptive use. To omit them would have seriously biased the sample of contraceptive users. For example, all intervals in which female sterilization was used were open. We included open intervals in the analysis only if a woman had resumed menstruation and had been at risk of pregnancy for at least one month. Although contraceptive use is still possible in such intervals, appropriate handling of it statistically would have required a multistate hazard model, which was beyond the scope of the current analysis.

als for a given woman) was .41 for the dichotomous logit regression explaining whether contraception was practiced. The intragroup correlations ranged from .01 for sterilization and .22 for pill, to .75 for folk methods. They were consistent with research (DaVanzo et al. 1989) showing that the probability of remaining with the same contraceptive method from one interval to the next was generally higher with more traditional methods.

FINDINGS

Column 1 of Table 7.1 presents coefficients and *t*-statistics of the dichotomous logit equation explaining whether contraception was practiced in an interval. Columns 2-7 present estimates of the parameters of the multinomial logit equation explaining method choice. Because the model includes interactions of clinic availability with desire for more children and with education, the parameters in Table 7.1 show the effects of each of these three variables when the other two variables equal zero. Table 7.2 shows effects for each of the three variables for alternative values of the other two. All statements about statistical significance use a 5 percent level of significance (one-tail test).

Desire for More Children

As expected, women who did not want more children were much more likely to practice contraception than were women who had not yet reached their family-size goal. (The first two rows of Table 7.2 show the effects of not wanting more children, as compared with wanting more, for those who did not have a family planning clinic nearby and for those who did, respectively). There has been debate in the literature about the usefulness of survey questions on desired family size and whether such reported preferences affect actual behavior (Scott and Chidambaram 1985; Tsui 1985; Lightbourne 1985; Cleland 1985). Our results suggest that such data are useful in explaining contraceptive use in Malaysia, even when they are used to create retrospective indicators of whether more children were desired at dates before the survey. This suggests a fair degree of stability in women's family-size desires over the period studied.

Desire for no more children was an especially important impetus to contraceptive use before a community had a family planning clinic nearby. The first coefficient in the first row of column 1 of Table 7.1 indicates that, other things being the same, before a community had a family planning clinic nearby, a change from desiring to not desiring more children increased the odds ratio of practicing contraception by a factor of four ($e^{1.38}$). For example, if the probability of practicing contraception was .20 when the couple desired more children, it increased to .50 when they did not want more children, other things being the same ($4[.20/.80] = 1.0 = .50/.50$). When a family planning clinic was nearby, this factor was reduced by nearly one-

Table 7.1. Determinants of contraceptive practice and method choice: Peninsular Malaysia, 1961-76
(Logit coefficients and *t*-statistics)

Explanatory variable	Whether practiced any meth- od: logit (<i>n</i> = 3,473)	Method choice: multinomial logit ^a (<i>n</i> = 3,425)					
		Sterilization	Pill	Condom	Rhythm	Abstinence	Folk methods
Household characteristics							
Woman desires no more children (D) ^b	1.38 (8.00)	9.42 (6.32)	1.69 (5.60)	3.04 (2.86)	1.09 (1.80)	3.29 (3.72)	-.0265 (-0.08)
Woman's education (years) ^b	.107 (4.49)	.152 (2.50)	.122 (4.33)	.266 (2.66)	.274 (3.14)	.0635 (0.90)	.0185 (0.32)
Household income (log.)	.149 (1.63)	.480 (2.11)	.374 (3.57)	.499 (1.82)	-.233 (-0.55)	-.178 (-0.72)	-.116 (-0.57)
Duration of postpartum amenorrhea (months)	-.0193 (-2.27)	-.0177 (-1.30)	-.0268 (-3.29)	-.0255 (-2.19)	-.0404 (-3.38)	-.0053 (-0.34)	.0038 (0.23)
Child died during 4 years before next pregnancy outcome (D)	-.670 (-3.16)	-.884 (-3.20)	-.540 (-3.99)	-.357 (-1.03)	-.359 (-1.57)	-1.11 (-5.57)	-.463 (-1.73)
Preceding child born in hospital (D)	.542 (2.98)	.647 (0.92)	.571 (2.26)	.144 (0.26)	.394 (0.71)	.604 (1.64)	.668 (1.65)
Woman's age	.403 (3.74)	.261 (0.78)	.556 (4.38)	.318 (1.16)	.904 (3.06)	-.107 (-0.35)	.0551 (0.31)
Woman's age squared	-.007 (-3.43)	-.0031 (-0.46)	-.0105 (-4.27)	-.0051 (-0.90)	-.0152 (-2.66)	.0036 (0.59)	-.0003 (-0.09)
Ethnicity							
Chinese (D)	.0849 (0.61)	1.12 (3.53)	.798 (4.41)	2.36 (5.26)	1.81 (4.55)	1.73 (4.47)	-2.52 (-7.79)
Indian (D)	-.552 (-2.93)	2.22 (4.05)	-.323 (-1.51)	.964 (2.55)	.752 (1.80)	1.91 (3.82)	-2.56 (-7.48)

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Community characteristics							
Degree rural (10 = most urban, 40 = most rural)	-.0061 (-1.00)	.0003 (0.02)	-.0024 (-0.36)	-.0048 (-1.41)	-.0227 (-1.41)	.0001 (0.00)	-.0166 (-1.21)
Family planning clinic (FPC) nearby (D)	.640 (3.22)	.325 (0.42)	.584 (1.78)	.919 (1.02)	.821 (0.97)	1.94 (2.16)	.0506 (0.16)
FPC × desires no more children	-.645 (-2.47)	1.66 (0.64)	-.936 (-2.01)	-3.80 (-3.14)	1.05 (0.84)	-1.47 (-1.13)	.292 (0.68)
FPC × woman's education	-.0505 (-1.62)	-.0151 (-0.12)	-.0573 (-1.10)	.0515 (-0.39)	.409 (1.94)	-.100 (-0.97)	.0123 (0.23)
Don't know if clinic is available (D)	.201 (1.66)	-.143 (-0.38)	.131 (0.69)	.688 (1.48)	.424 (0.84)	.435 (0.86)	.0734 (0.24)
Year interval began (splines)							
1961-65	.0789 (2.36)	-.0825 (-1.27)	.109 (3.49)	-.0636 (-0.85)	-.0761 (-1.13)	-.110 (-1.53)	.0782 (1.42)
1966-70	.0775 (2.69)	.284 (2.76)	.114 (2.80)	.228 (2.10)	.110 (1.25)	.175 (1.65)	-.0481 (-0.91)
1971-76	-.0493 (-1.25)	-.212 (-0.98)	.0312 (-0.43)	-.0937 (-0.43)	-.608 (-2.78)	-.221 (-1.20)	-.0090 (-0.14)
Constant	-1.34	-14.5	-20.3	-12.1	-13.3	2.57	-6.66
X ²	598.	—	—	—	—	—	—
Proportion of intervals in which method was used	.287	.019	.135	.018	.022	.023	.060

Notes: Values in parentheses are *t*-statistics. Estimation allows for intragroup correlation. Sample excludes open intervals in which the woman was still amenorrheic or resumed menstruation a month or less before the survey.

D = dichotomous variable.

^aExcluded are 48 intervals in which a method other than one of these six was practiced.

^bSee also interaction of this variable with dummy for family planning clinic availability.

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Table 7.2. Total effects of desire for no more children, education, and family planning clinic availability: Peninsular Malaysia, 1961-76 (Logit coefficients and *t*-statistics)

Explanatory variable	Any method	Method choice					Folk methods
		Sterilization	Pill	Condom	Rhythm	Abstinence	
Desire no more children (versus desire more children)							
No family planning clinic nearby	1.38 (8.21)	9.42 (15.0)	1.69 (6.58)	3.04 (4.93)	1.09 (1.89)	3.29 (6.00)	-.0265 (-0.07)
Family planning clinic nearby	.735 (3.35)	11.08 (13.7)	.754 (2.25)	-.763 (-0.95)	2.14 (2.88)	1.83 (2.56)	.265 (0.58)
Woman's education							
No family planning clinic nearby	.107 (6.34)	.152 (2.62)	.122 (5.28)	.266 (4.82)	.274 (5.33)	.0635 (1.29)	.0185 (0.58)
Family clinic nearby	.0560 (2.47)	.137 (1.60)	.0650 (1.89)	.215 (2.63)	.683 (9.09)	-.0365 (-0.51)	.0307 (0.66)
Family planning nearby (versus no clinic nearby)							
Woman's educaton = 0 years							
Desire more children	.640 (3.58)	.325 (0.50)	.584 (2.24)	.919 (1.48)	.821 (1.42)	1.94 (3.50)	.0506 (0.14)
Desire no more children	-.0042 (-0.02)	1.98 (1.97)	-.352 (-0.88)	-2.88 (-3.01)	1.88 (2.10)	.467 (0.55)	.342 (0.62)
Woman's education = 6 years							
Desire more children	.337 (2.43)	.234 (0.45)	.240 (1.15)	.610 (1.22)	3.27 (7.07)	1.34 (2.99)	.124 (0.44)
Desire no more children	-.308 (-1.19)	1.89 (1.96)	-.696 (-1.81)	-3.19 (-3.48)	4.33 (5.07)	-.130 (-0.17)	.416 (0.79)

Note: The *t*-statistics in this table are not adjusted for intragroup correlation because the variance-components computer program we used did not calculate test statistics for linear combinations of coefficients.

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half ($e^{.735} = 2.1$). (This effect is calculated by adding the coefficients of "woman desires no more children" and "family planning clinic \times desire no more children." The t -statistic for this sum is computed by considering the variances and covariance of these two coefficients.)

These results suggest that before family planning was readily available in a community, desire to stop childbearing was an exceptionally strong determinant of whether contraception was practiced. Once contraception was more readily available through family planning clinics, couples apparently began using it for spacing also and the desire to have no more children was not so strong a determinant of whether contraception was practiced, though it was still very important.

We found that couples who did not want more children were especially likely to use effective methods of contraception. When no family planning clinic was nearby, the desire for no more children was related to much higher odds that couples would choose sterilization over no contraception; it also significantly increased the odds that they would choose the pill, condom, rhythm, or abstinence over no contraception. Folk methods were the only methods whose use was not significantly related to family-size desires.

When a family planning clinic was in or near the community, desire to stop childbearing impelled an even larger increase in the odds that sterilization would be practiced. This was true also for rhythm, though the effects were considerably smaller than for sterilization. By contrast, the pill, condoms, and abstinence were less likely to be used by those desiring to stop childbearing than by those still desiring more children when a clinic was nearby than when one was not. Nonetheless, the desire to stop childbearing was associated with a significant increase in the odds that the pill or abstinence would be used even when family planning methods or information were available through nearby clinics. Contrary to the situation before the initiation of family planning services in or near a community, however, when there was a family planning clinic nearby, desire to stop childbearing no longer significantly affected the likelihood that condoms would be used. This finding suggests that family planning clinics discourage the use of condoms as a stopping method.

These results tend to confirm a finding from other studies of Malaysia (e.g., Chander et al. 1977) and of other developing countries (Phillips et al. in Chapter 11 of this volume; Srikantan 1985; Brackett 1980)—that couples practice contraception primarily to limit the number of births. Nonetheless, we found in these data that a significant proportion of Malaysian women who wanted more children used some form of contraception, primarily the pill (Table 7.3). In our sample, women who said that they still wanted more children practiced contraception during approximately one-quarter of their pregnancy intervals. The interactions of desire for no more children and family planning clinic availability (shown in Table 7.1) sug-

Table 7.3. Percentage distributions of contraceptive practice among women 35 years of age or younger wanting and not wanting more children: Peninsular Malaysia, 1961-76

Method used	Not wanting more children (<i>n</i> = 357)	Wanting more children (<i>n</i> = 2,647)
Some method	58.3	24.6
Sterilization	15.4	0.2
Pill	24.9	12.4
Condom	3.6	1.5
Rhythm	6.7	1.8
Abstinence	4.2	1.9
Folk methods	3.4	6.7
No method	41.7	75.4
Total	100.0	100.0

Notes: Excludes cases for whom desire for more children was not reported. Percentages may not sum exactly to totals because of rounding.

gest that family planning clinics help to promote the use of contraception for spacing purposes.

Women's Education

Better-educated women were significantly more likely to practice contraception than were their less educated counterparts, other things being the same. This finding was consistent with those from other studies in Malaysia (Rodriguez 1978) and other countries (e.g., Hogan and Frenzen 1981 for northern Thailand). In our data the finding held true whether or not a family planning clinic was nearby.

At the sample means, a one-year increase in education increased the odds ratio that contraception would be practiced in an interval by a factor of 1.11 when no clinic was nearby; this was equivalent to an increase of 2.2 percentage points ($BP[1-P]$) at the sample mean probability. It may have occurred because better-educated women are more likely to be aware of contraceptives or because they are more receptive to new technologies.

The effect of a one-year increase in education fell to 1.1 percentage points when the community had a family planning clinic nearby. A similar effect of family planning clinics on educational differentials in contraceptive use has been found in other developing countries (Chapter 11, by Phillips et al; Chapter 4, by Jones; Rosenzweig and Seiver 1982; Entwisle et al. 1984).

When no family planning clinic was nearby, increases in education significantly increased the likelihood that couples would choose sterilization, the pill, condoms, or rhythm, but they did not significantly affect the likelihood of choosing abstinence or folk methods as opposed to using no con-

trapection. This is similar to Rosenzweig and Seiver's (1982) finding that women with more education were more likely than other women to adopt newer birth control methods (pill and IUD). Results from the World Fertility Survey indicated that better-educated women had higher use rates for both traditional and modern methods (Mamlouk 1982). Tables 7.1 and 7.2 show somewhat smaller, though not significantly smaller, effects of education on use of sterilization, the pill, and condoms when a clinic was nearby than when one was not. Clinic availability, however, significantly increased the effect of education on the likelihood that rhythm would be chosen.

The largest relative effects of education occurred for rhythm, especially after family planning clinics were established. In the sample for the multinomial logit analysis, the average education of rhythm users (6.8 years) was higher than that of users of any other contraceptive method (the sample mean was 3.2 years). That is undoubtedly why rhythm has been a relatively effective method in Malaysia (DaVanzo and Butz 1982). Other studies of developing countries have also found greater use of rhythm among the more educated (e.g., Liskin 1981; Bulatao 1985b; Zablan 1985). Bulatao has suggested that this relationship reflects better information about or greater sensitivity to side effects of other contraceptives among the more educated. Laing (1984) found a similar relationship between concern about medical safety and convenience on one hand and greater use of rhythm among Filipino women on the other. The high education of many rhythm users in Malaysia may also be due to their being Catholics. Catholics in Malaysia are more highly educated than other religious groups (Chander et al. 1977:A122). Unfortunately, we cannot test this hypothesis directly because religion was not documented in the MFLS data.

The second-largest effect of education and mean educational level (6.0 years) occurred among condom users. Choe (in Chapter 6) and Chamrathirong and Stephen (in Chapter 8) report similar findings for Thailand and the Republic of Korea, respectively: increases in women's education have been associated with increases in condom use. It may be that better-educated women have more say in family decision making and are able to persuade their husbands to accept more responsibility for family planning; or it may be that the better educated are better informed about where to purchase condoms and prefer not to rely on clinics for supplies.

The relatively low education coefficients for the pill, and the finding that the average education of women who used the pill was lower (4.7 years) than that of couples who used condoms or rhythm, may have been due to more-educated women's having a greater awareness of the pill's side effects and choosing not to use it for that reason.

Several studies in developing countries have found sterilization to be linked to lower education and have suggested that this association was due to poor people's lack of access to other methods (Khan 1977; Philliber and

Philliber 1985; Swenson and Khan 1982). In our data, the average education of women who had been sterilized, or whose husbands had been sterilized, was lower (4.1 years) than that of pill, condom, and rhythm users. However, when we controlled other factors (including income), we found a positive association between wives' education and the likelihood that couples practiced sterilization rather than no contraception, pill, abstinence, or folk methods.

Family Income

Family income had a positive effect on the likelihood that some form of contraception was practiced, but the coefficient was not statistically significant. When we considered the various contraceptive methods separately, however, the income effect was significantly positive for sterilization, the pill, and the condom—the three methods costing the most. Although the coefficients were not statistically significant, it is interesting that income was negatively related to the practice of the more traditional methods of rhythm, abstinence, and folk methods. This finding suggests that these methods were “inferior” goods, i.e., goods that consumers would “buy” less of when their incomes rose.⁴ The positive association between income and contraceptive use has been found in other developing countries (e.g., Bulatao 1985b; Mamlouk 1982; Richards 1983; Chapter 11, by Phillips et al.) and in Japan (Coleman 1981). Use of more sophisticated contraceptives than the condom was related to family income in Japan (Coleman 1981). In Colombia, household income was significantly related to choice of the pill (Kahley and Gillaspay 1977). Several studies have found cost to be a major obstacle to sterilization in developing countries—e.g., in Honduras (Janowitz et al. 1983) and in Brazil and the Republic of Korea (Liskin and Rinehart 1985). In Bangladesh, the odds of choosing sterilization was inversely related to one measure of economic status (land holding) but positively related to another (possession of modern objects) (Phillips et al. 1985).

Duration of Postpartum Amenorrhea

Contraception is unnecessary during the anovulatory period following a birth, which we approximated here by the duration of postpartum amenorrhea. For a given desired total interpregnancy interval, the longer the duration of postpartum amenorrhea, the shorter is the desired menstruating

4. Even though income was modestly correlated with desired family size in these data, the estimated income effects barely changed when desire for no more children was not controlled. Our significant income effects are noteworthy because our income measure was based on retrospective reports of the husband's and wife's wages, hours, and other income, and was adjusted through complex imputation procedures that made use of more detailed data on families' income and wealth at the time of the survey. Hence, income was probably measured with considerable error, which would bias its coefficients toward zero.

interval and hence the less is the need to practice contraception. Therefore, as long as the duration of amenorrhea does not have a highly positive correlation with the length of the desired total interpregnancy interval, the practice of contraception in an interval and the effectiveness of the method chosen should be inversely related to the duration of the preceding amenorrhea.⁵ Indeed, this proved to be the case in Malaysia. Calculated at the sample means, each additional month of amenorrhea significantly reduced the probability that contraception would be practiced by an average of 0.4 percentage points.

Since duration of breastfeeding is the primary determinant of duration of amenorrhea, this result suggests that Malaysian women treat breastfeeding and other forms of contraception as substitutes and practice contraception more when they breastfeed less. (Other findings supporting this substitution hypothesis [DaVanzo and Haaga 1982; see also Millman 1985] are that, over the period studied, breastfeeding declined while the use of contraceptives, especially modern methods, increased, and that the ethnic groups who breastfed most were least likely to practice contraception, and vice versa). As amenorrhea became shorter, couples were especially likely to use the more effective methods—pill, condom, or rhythm. This relationship was strongest for the pill, whose use was medically contraindicated during breastfeeding over the period studied, and for rhythm, which cannot be used before normal menstrual periods resume.

Recent Child Death

It has been frequently hypothesized, and often empirically confirmed, that when a child dies the couple has another child sooner than it might otherwise have had (Preston 1978). Some of the observed relationship has been found to be biological, i.e., to operate via curtailed lactation and shorter amenorrhea. However, the relationship may be partly behavioral, owing to less use of contraception.

We have explored this possibility in Table 7.1 by including a dummy variable that equals 1 if one of the woman's children died within 48 months of the next pregnancy outcome (or date of interview). The negative and highly significant coefficient of this variable was consistent with the hypothesis that women in our sample attempted to replace a child who had died by using contraception less. The relationship was negative for each of the six specific contraceptive methods considered and was statistically significant for sterilization, the pill, abstinence, and folk methods.

In the literature, curtailed breastfeeding is often considered to be the main factor explaining shorter birth intervals following children's deaths. Our

5. An earlier analysis of the determinants of breastfeeding among MFLS respondents (Butz and DaVanzo 1981) suggests that desired birth spacing was not an important factor in explaining variations in breastfeeding.

results, like those of Brackett (1980), suggest that reduced contraceptive use is an important cause as well.

Hospital Births

Women in our sample who gave birth in hospitals were significantly more likely to practice contraception than were other women. For example, if the probability of contraception in an interval was .20 after a nonhospital birth, it increased to .30 after a hospital birth. This relationship may have arisen because women who gave birth in hospitals received advice about contraception from physicians or nurses there. We know that the National Family Planning Board's postpartum program began with a hospital base and counseled women to practice contraception after they gave birth. In our sample, the estimated effect of a hospital birth was sizable for the pill and sterilization, and also, surprisingly, for folk methods and abstinence. The relationship for sterilization may have been due partly to reverse causation, however, if women decided to deliver at hospitals because they wished to have a tubal ligation after delivery. In Malaysia a tubectomy costs less if it is performed within the first six weeks post partum.

Women's Age

The relationship between age and contraceptive use has an inverted-U shape, peaking at age 29. This relationship was highly significant and remained about the same when we excluded the variable indicating whether more children were desired. The inverted-U shape of the contraception-age relationship contrasted with the U-shaped relationship we estimated between age and the duration of the menstruating interval when other factors (including contraceptive use) were controlled (DaVanzo and Butz 1982). These two patterns suggest that women are less likely to practice contraception at the ages when, other things being the same, the risk of conception is lowest. Data from the World Fertility Survey and the Contraceptive Prevalence Surveys reveal this same inverted U-shaped pattern in contraceptive use for at-risk women in all the developing countries surveyed (Chapter 6, by Choe; Brackett 1980; Mamlouk 1982).

The estimated relationship between age and contraceptive practice had a similar shape for the pill, the condom, and rhythm (peaking at ages 26.5, 31, and 30, respectively). By contrast, the likelihood of using sterilization, abstinence, and folk methods continued to increase with age throughout the age range considered here, though neither the age coefficients nor their linear combinations were significant for those methods. In the case of sterilization, the couple's commitment to having no more children (or, alternatively stated, the perceived cost of having an unwanted child) may have increased with their age; Choe also found that use of female sterilization rose with age in the Republic of Korea. The increase in abstinence with

age is consistent with the negative relationship observed by Nag (1983) between coital frequency and age or marriage duration. The increase with age in the practice of folk methods may reflect a cohort effect.

Ethnicity

When no other variables were controlled, the data showed Chinese women to be significantly more likely to practice some form of contraception than Malays, but we found no significant difference between Indians and Malays. When other variables were controlled, however, the Chinese-Malay difference was much smaller and statistically insignificant, whereas Indians were significantly less likely to practice contraception than were Malays. Hence, most of the gross Chinese-Malay differential was due to differences in income, desired family size, and other factors controlled in our analyses. By contrast, the absence of a significant Indian-Malay gross differential masked the fact that, when socioeconomic differences were controlled, Malays were significantly more likely than Indians to practice some form of contraception.

Ethnicity strongly influenced the type of contraceptive chosen. Compared with Malays, Chinese were especially likely to use sterilization, the pill, condoms, rhythm, or abstinence. Indians also were more likely than Malays to use condoms or rhythm and even more likely than Chinese to be sterilized or to practice abstinence. Indians, however, were less likely than Malays to use the pill; this finding is similar to that by Rele et al. (Chapter 10) that pill use was lower among Hindus in India than among Muslims. The low probability of sterilization for Malays is consistent with the Islamic teaching that sterilization is acceptable only when the health of the mother is in danger (Ibrahim 1977:27) and with the lower rates of sterilization among Muslims than among other ethnic groups in Thailand (Chamrathirong and Stephen, in Chapter 8), India (Rele et al., in Chapter 10; M.E. Khan 1985), and Indonesia (Bost 1985). By contrast, Chinese and Indian religions view sterilization as a generally acceptable form of contraception. The high rate of sterilization we found among Malaysian Indians, most of whom were Hindus, is consistent with data from India showing sterilization rates to be highest for Hindus (M. E. Khan 1985). More Malays used folk methods than did either of the two other ethnic groups.

Rural-Urban Differences

Whether a community is rural or urban may affect contraceptive norms. When no other variables were controlled, we found that couples were significantly less likely to practice contraception the more rural the areas were where they lived. This was true for all the contraceptive methods considered except for folk methods. When we controlled other influences on contraceptive use, including availability of a family planning clinic (Table 7.1), however, rurality did not significantly affect whether a couple practiced con-

trapection or the specific method chosen. This finding was consistent with evidence from other studies (Brackett 1980; Bulatao 1985b; Johnson 1979; Mamlouk 1982; Mauldin and Lapham 1984) that urban-rural differentials in contraceptive use were primarily attributable to the unavailability or inaccessibility of family planning services in rural areas. The Malaysian national family planning program began with an urban focus.

Family Planning Clinics

Table 7.1 contains a dichotomous variable indicating, for each primary sampling unit (PSU), whether a family planning clinic was nearby (within 32 kilometers, or 20 miles, of the PSU boundary) at the time of the at-risk interval. The regression also includes a dichotomous variable indicating uncertainty about the existence of a nearby clinic at the beginning of the interval; it means that we were unsure either of the exact date when the clinic started or of whether there was a clinic because the couple lived in a nonsample community at the time in question. The variable indicating the existence or absence of a nearby clinic was entered alone and in interaction with both the woman's desire for another child and her educational attainment, to allow the effect of a clinic on contraceptive use to vary with these factors. Table 7.1 shows the coefficients of those interactions. The lower half of Table 7.2 shows the full effects of having a clinic nearby for alternative values of the other two variables.

For contraceptive use in general (column 1), the establishment of a family planning clinic nearby significantly increased the probability that women who desired more children practiced contraception. Among women who still desired more children at the time, the effect of a clinic nearby was greatest for the least educated; the clinic's establishment doubled the odds of contraceptive practice in this case and was associated with substantial increases in the likelihood that the pill, condom, rhythm, or abstinence was used.

Among women who did not desire to have more children, the establishment of a nearby clinic did not affect their likelihood of practicing some form of contraception. It did, however, affect their likelihood of practicing particular contraceptive methods, specifically sterilization (female or male) or rhythm, and their likelihood of not using condoms, compared with using no contraception.

The presence of a clinic had less influence on better-educated women. This finding is similar to one by Freedman et al. (1981) for Indonesia, where family planning clinics had a greater effect on contraceptive use among the rural, less educated poor. Our own finding suggests that better-educated women managed to practice contraception even without a family planning clinic being nearby, and the establishment of a clinic had less influence on their behavior than it did on women with less education. Hence, family

planning clinics seem to be most effective in promoting contraception for birth spacing by less educated women and are associated with increased use of sterilization by couples who do not desire more children. Only for the rhythm method did more education increase the relative odds that a clinic would be associated with increased contraceptive use.

The strong positive associations in these data of clinic availability with use of rhythm and abstinence appear to reflect the activities of the earliest family planning clinics in Malaysia, in years before the pill was readily available. Regressions (not presented here) that included interactions of clinic availability and calendar year showed that clinics had stronger relative effects for many methods, including these two, in the earlier years covered by the data. Furthermore, when clinic types are distinguished, the relative effects (not presented here) are strongest for these two methods (and most others) for Family Planning Association clinics, the first type of family planning clinics in Malaysia.

When we did not control other socioeconomic variables, the estimated effects of the presence of a family planning clinic on contraceptive use were much larger than those shown in Table 7.1. For example, when we simply considered whether a clinic was nearby (without the interactions of Table 7.1), a clinic increased the odds that contraception was practiced by a factor of 3.1 ($t = 10.7$) when no other variables were controlled, compared with 1.4 ($t = 2.26$) when other variables were controlled. This suggests that much of the apparent effectiveness of family planning clinics in promoting contraceptive use may be due to other factors that coincided with the establishment of the clinics or that characterized the areas in which clinics were first established. For example, National Family Planning Board clinics tended to be located in urban areas, where women were already motivated to practice contraception—that is, where income and education were high and desired additional fertility was low. This finding has important implications for the evaluation of program effectiveness in promoting contraceptive use and reducing fertility. Unless other factors are controlled, estimates of the effectiveness of family planning programs may be biased, most likely overstated (see also Haaga 1985). Nonetheless, even when other factors are controlled, family planning clinics do appear to have been effective in significantly increasing the likelihood that contraception was practiced in Malaysia, especially for spacing purposes, by less educated women, and with relatively effective methods (see also Tsui et al. 1981).

Time Trend

We entered the calendar year as a spline in Table 7.1 to allow its effect to be nonlinear. (A spline allows one to estimate connected linear segments—three for dates in Table 7.1—as an approximation to a nonlinear function. Each coefficient is the slope of that particular linear segment.) When we

held constant the other variables in Table 7.1, we found contraceptive use rates to have increased significantly between 1961 and 1970 at an average rate of 1.6 percentage points per year. After 1970 the time trend was not significantly different from zero.

With other variables not controlled, the time trend was much stronger in each five-year period, especially the first and the last (DaVanzo et al. 1986:table 4). This finding implies that much of the increase in contraceptive use over the period, especially in the years 1961–65 and even more so during 1971–76, was due to the variables included in our model. The remaining, unexplained, time trend in contraceptive use was considerably smaller when those variables were controlled and, in fact, vanished for the 1971–76 interval.

Nonetheless, the data indicate significant increases in contraceptive use in the 1960s, even when other correlates of contraceptive use were controlled. The increased use may have been due to more knowledge and awareness of family planning in general, independent of whether a clinic had been established near a community. Perhaps it was also due to increased commercial availability of family planning methods, not documented in our data. Data from the Malaysian Fertility and Family Survey show that, by 1974, 36 percent of family planning acceptors were obtaining their contraceptives from private sources.

Other things being equal, each method, except folk methods, exhibited its greatest otherwise-unexplained increase between 1966 and 1970. Pill use also increased rapidly and significantly between 1961 and 1965. Other things being the same, the use of most methods decreased over the period 1971–76; these declines were statistically significant for rhythm and abstinence.

As with contraceptive practice in general, the time trends for specific methods were quite different when other variables were not controlled. For example, pill use increased significantly after 1971, with a coefficient of .190 ($t = 3.87$) when no other variables were controlled, whereas rhythm and abstinence did not exhibit a significant time trend in this period. As with contraceptive use in general, it appears that much of the time trend in the use of specific methods, shown in Figure 7.1, is accounted for by changes over time in the other variables considered. This is especially true in the 1961–65 and 1971–76 intervals. Nonetheless, even when these other factors were controlled, there remained significant increases that were not due to the factors we have considered; this is the case for sterilization, condoms, and abstinence in the late 1960s and for the pill throughout the entire decade of the 1960s. When we controlled the socioeconomic factors accounting for the modest increase in rhythm use in the early 1970s, it appeared that this method might be losing favor among Malaysian couples.

SUMMARY AND CONCLUSIONS

Contraceptive use rates increased dramatically in Malaysia over the 1961-75 period. The greatest increase occurred for the pill. By the mid-1970s, oral contraceptives accounted for more than half of the total time Malaysian women were protected by some form of contraception. Female sterilization and condom use also increased over the period.

Explanatory variables did not affect the likelihood of use of various contraceptive methods in the same ways. Some factors were associated with increased use of some methods and decreased use of others. Hence, consideration restricted to only a simple indicator of whether contraception was used could mask other important influences that might affect the effectiveness of contraceptive practice.

Influences on Choices of Particular Methods

Sterilization. Many more women than men elected to be sterilized in Malaysia. We found, not surprisingly, that the desire to have no more children was the most powerful influence on a couple's decision to choose this permanent form of contraception. This desire was even more likely to result in a decision to have a tubal ligation or a vasectomy when a family planning clinic was nearby. Family planning clinics apparently provided information about sterilization.

More female education and higher family income increased the likelihood of sterilization. Indians were the most likely ethnic group to choose sterilization, and Malays the least likely. Sterilization was more likely if the last child had been born in a hospital, although the direction of causation was ambiguous. Couples who had recently experienced the death of a child were much less likely than other couples to use this method. Even after taking other socioeconomic, demographic, and community correlates into account, we found the number of sterilizations to have increased significantly in the late 1960s.

The Pill. Women who wanted no more children were more likely than others to use the pill, but many women chose this method to space births as well. The higher a woman's education, the more likely she was to use the pill. The relative effect of education on pill use was strongest among couples who did not live near a family planning clinic. Family planning clinics appeared to be especially effective in promoting pill use by less educated women for birth spacing.

The higher a woman's family income, the more likely she was to use the pill rather than no contraception or traditional methods. A shorter period of postpartum amenorrhea following a previous birth and a recent birth in a hospital also increased the likelihood that she would use the pill, but a recent child death decreased the likelihood. Chinese women were the

most likely ethnic group to use the pill, whereas Indian women were the least likely.

Even when the establishment of family planning clinics and changes in the socioeconomic and demographic factors associated with its use were taken into account, we found pill use to have increased significantly throughout the decade of the 1960s. This was probably due to a general increased awareness of the method and to growing commercial availability of oral contraceptives.

Condoms. Before they had family planning clinics nearby, couples were likely to use condoms when they did not want to have any more children. The establishment of family planning programs appeared to discourage the use of condoms to end childbearing. As with sterilization and the pill, increased female education, higher family income, and shorter postpartum amenorrhea were all associated with increased condom use during an interpregnancy interval. The wife's having more education increased the probability that the couple would choose condoms more than it increased the probability of their choosing sterilization or the pill. Chinese and Indians were more likely to use condoms than Malays. Like use of sterilization and the pill, use of condoms increased in the late 1960s independently of other changes that occurred in the period.

Rhythm. Both before and after the establishment of a family planning clinic nearby, couples were more likely to use rhythm as a stopping rather than a spacing method. Better-educated women were more likely than others to use this method, especially if a clinic was nearby. Clinics appear to have encouraged use of the rhythm method before pills were widely available in Malaysia and may have specifically encouraged its use among more-educated women, who were presumably perceived to be more capable of using it properly. Having a family planning clinic nearby was associated with use of rhythm, especially by educated women who wanted no more children.

Like most of the methods already discussed, rhythm was less likely to be used after prolonged postpartum amenorrhea, soon after a child's death, or by Malays. Its use was not associated with higher income, however, and declined significantly in the first half of the 1970s.

Abstinence. Abstinence also was practiced primarily to stop childbearing, especially before family planning clinics were established. Like most other methods, it was less likely to be used after a child's death. Reliance upon abstinence was not related to women's education or family income. Use of this method increased in the late 1960s, independently of other socioeconomic and demographic factors, but declined in the 1970s.

Folk Methods. Malay ethnicity was the main correlate of the use of traditional folk methods. These methods were less likely to be used after a child's

death. None of the other socioeconomic and demographic variables considered in the analysis were significantly associated with the use of this method.

Implications for Observed Trends in Contraceptive Use during 1961-75

Our study found that couples were more likely to practice contraception when they did not want to have any more children than when they wanted to delay births. The decline in desired family size over the study period (documented by the Malaysian Fertility and Family Survey; see Chander et al. 1977:119-120) hence contributed to the increase in contraceptive use. Nevertheless, a sizable proportion of contraception in Malaysia was for the purpose of spacing births. The establishment of a family planning clinic in or near a community was associated with an increase in both the use of contraception for spacing purposes and acceptance of sterilization by couples who desired no more children.

The availability of family planning services through nearby clinics narrowed educational differences in contraceptive use. Clinics appeared to be especially effective in promoting contraceptive use by less educated women; better-educated women apparently managed to practice contraception even when a clinic was not nearby and were less affected by its establishment. Nonetheless, education was still positively related to contraceptive use rates even in communities served by clinics, possibly because more-educated women were more aware of contraception or more receptive to new technologies.

A rise in the average educational level of women of childbearing age in Malaysia between 1961 and 1975 hence contributed to the increase in contraceptive usage over the period. Malaysia's impressive income growth during the period did not significantly affect the trend in overall contraceptive use, but it did contribute to increased use of sterilization, pills, and condoms.

Our data showed that the likelihood of contraception being practiced during an interbirth interval was inversely related to the duration of amenorrhea that began the interval; this was especially true for the more effective methods of contraception. Hence, the sizable decreases in duration of amenorrhea that occurred in Malaysia over this period (DaVanzo and Butz 1982:6-7) contributed to the increase in contraceptive use. But increased contraceptive use due to this cause did not necessarily contribute to the decline in fertility, since it may have merely substituted for the loss in contraceptive protection from breastfeeding. The finding of an inverse relation between duration of postpartum amenorrhea and likelihood of practicing contraception adds to accumulating evidence that women treat breastfeeding and other contraceptive methods as substitutes.

Couples were less likely to practice contraception after a child's death, in an apparent attempt to replace the child who had died. Hence, the sub-

stantial reductions in infant and child mortality that occurred in Malaysia over the study period (DaVanzo and Habicht 1986:144) contributed to the increase in contraceptive use. Furthermore, this result implies that shorter birth intervals following child deaths are due to reduced use of contraception (especially reduced use of effective methods), as well as to shorter postpartum amenorrhea resulting from curtailed breastfeeding.

Since the mid-1960s, Malaysia has had an active national family planning program; by 1976, when the Malaysian Family Life Survey was fielded, women in 49 of the survey's 52 sampling areas had a family planning clinic no more than 4.8 kilometers, or three miles, from the boundary of their primary sampling unit and all women had a clinic within 19.3 kilometers, or 12 miles, of their sampling unit boundary. Our data indicated that proximity to family planning clinics encouraged contraceptive use, especially for birth spacing by less educated women, even when such factors as desire for another child, income, and education were held constant. This *ceteris paribus* effect of family planning clinics, however, was much smaller than that estimated when family planning clinics were the only factor we considered. The effectiveness of family planning clinics in promoting contraceptive use in Malaysia would have been seriously overstated if we had not controlled for the effects of such factors as income and education, which were positively correlated with the initiation and placement of public family planning services.

All of the variables just discussed changed in a direction that promoted a general increase in the use of contraception, and many of the changes helped to explain the increased use of more effective methods in particular.⁶ When we took these socioeconomic and demographic changes into account, the otherwise unexplained time trend in contraceptive use was much smaller but was still positive and statistically significant throughout the decade of the 1960s. It was in that decade that modern contraceptive methods first became widely available in Malaysia and awareness of family planning increased considerably. Some of the otherwise unexplained increase in contraceptive use may have been due to educational activities of family planning programs, which spread awareness of family planning regardless of whether a clinic was located nearby. Increased availability of contraceptives through commercial outlets and private practitioners undoubtedly contributed to the trend as well.

In sum, socioeconomic development in Malaysia—increases in education and income and reductions in mortality—have contributed to increased contraceptive use. Reinforcing the socioeconomic influences have been declines in desired family size and the practice of breastfeeding, which typi-

6. Research currently in progress (DaVanzo 1988) is assessing the relative roles of changes in socioeconomic and program factors in contributing to the time trend in contraceptive use, using person-years at risk (rather than pregnancy intervals) as units of observation.

cally accompany development, and the activities of an active family planning program.

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8 Determinants of Contraceptive Method Choice in Thailand

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Thailand has undergone rapid population growth during the twentieth century. The population increased from 8 million in 1911, when the first census was taken (Thailand, Ministry of Public Health, and Mahidol University 1983:106), to more than 51 million by 1985 (UN, Department of International Economic and Social Affairs 1988). Concern over this growth has resulted in the establishment by the government of family planning programs throughout the country. The government adopted a policy officially supporting voluntary family planning early in 1970, although some family planning activities had begun as early as 1963 (Knodel and Prachuabmoh 1973; Thailand, Ministry of Public Health, and Mahidol University 1983).

As a result of the government's family planning policies, contraceptive prevalence in Thailand has increased substantially in recent years. The revolution in contraceptive use, which started from a prevalence rate of less than 15 percent in 1969-70, reached 67 percent by 1984. This represents an extraordinary change nationwide in only 15 years. Numerous studies have investigated contraceptive use among the Thai population, but only one (Pejaranonda and Chamrathirong 1984) has focused on the determinants of method choice. In this chapter we examine the determinants of contraceptive method choice, using data primarily from the most recent Contraceptive Prevalence Survey of Thai women.

The Institute for Population and Social Research (IPSR) of Mahidol University and the Research Center of the National Institute of Development Administration, in collaboration with the Family Health Division of the Ministry of Public Health, jointly conducted the third national Contraceptive Prevalence Survey (CPS3) in 1984. The total sample, which was expanded from that of the previous surveys to improve regional estimates, included 7,576 ever-married women 15-49 years of age. The survey employed a multistage procedure to yield a nationally and regionally representative sample (Chamrathirong et al. 1986:278). A supplementary sample of Muslim women in the southern provinces of Satun and Yala was included to permit a more complete comparison of the Buddhist and Muslim populations of the Southern Region (IPSR et al. 1985).

The pattern of contraceptive use among married women has changed dramatically over time, as revealed by surveys dating back to 1969-70 (Table 8.1). Contraceptive prevalence increased from 14 percent in 1969 (Lon-

Table 8.1. Percentage of currently married women 15–44 years of age practicing contraception, by method used: Thailand, national survey data, 1969–84

Method	LS1, ^a 1969–70	LS2, ^b 1972–73	SOFT, ^c 1975	CPS1, ^d 1978–79	NS, ^e 1979	AFPH, ^f 1979	CPS2, ^g 1981	CPS3, ^h 1984
All methods	14	26	37	53	48	48	58	67
Pill	4	11	15	22	21	18	20	21
IUD	2	5	7	4	2	5	4	4
Injectable	*	1	2	5	5	6	7	9
Sterilization								
Female	5	6	8	13	15	12	18	22
Male	2	3	2	3	4	5	4	4
Condom	*	*	*	2	1	1	2	2
Others	1	*	3	4	1	1	3	4

Sources: Panel on Fertility, NRC (1982:table 36) and calculations from CPS3.

Note: The age distribution of currently married women as reported in the 1970 census was used as the basis for age standardization. Rounding errors, minor coding discrepancies, and users of unspecified methods account for the small differences between the percentages practicing individual methods and the percentage for all methods.

*0.5 percent or less.

^aLongitudinal Study of Social, Economic, and Demographic Change, Round 1.

^bLongitudinal Study of Social, Economic, and Demographic Change, Round 2.

^cSurvey of Fertility in Thailand (part of World Fertility Survey).

^dContraceptive Prevalence Survey, Round 1. Excluded provincial urban areas.

^eNational Study of Family Planning Practices, Fertility, and Mortality.

^fAccelerated Family Planning and Health Project Baseline Survey. Included a universe of 20 provinces and provincial urban areas.

^gContraceptive Prevalence Survey, Round 2.

^hContraceptive Prevalence Survey, Round 3.

gitudinal Study of Social, Economic, and Demographic Change, Round 1—LS1) to 58 percent in 1981 (CPS2) and 67 percent in 1984 (CPS3). Female sterilization (tubal ligation) was the most popular method in 1969–70, though only 5 percent of married women were using it then. It has also showed the greatest increase, rising from 13 to 22 percent between 1978–79 and 1984. The rise in female sterilization alone accounted for nearly all of the increase in contraceptive use between 1978–79 and 1981, and for 68 percent of the increase during 1981–84. The pill was the most popular contraceptive method in 1972–73, at 11 percent, but its use has increased little since the mid-1970s. Use of injectables increased to nearly 9 percent by 1984, but use of the IUD, male sterilization (vasectomy), and condoms increased only slightly.

Sterilization is thus an important birth control method in Thailand. For practical purposes, it must be considered irreversible. Because women (or their spouses) who were sterilized had reached the decision to use that form of contraception prior to the time of the interview, numerous characteristics of the women may have changed since the operation. Thus, methodologically and logically, sterilized women are excluded from this analysis of *current* contraceptive choice. It is useful, however, to consider briefly the characteristics of couples who had chosen sterilization.

As expected, the distribution of sterilized persons varied between urban and rural areas, between the two dominant religious groups (Muslims and Buddhists), and among educational groups (Table 8.2). Bangkok had a larger proportion of sterilized couples (32 percent) than did provincial cities (30 percent) or rural areas (24 percent), but a slightly larger percentage of women in the provincial urban areas than in Bangkok had been sterilized. Muslims, particularly southern Muslims, had the lowest prevalence of sterilization. The strong regional effect was also present among the Buddhists, those in the Southern Region having a somewhat lower prevalence than Buddhists elsewhere. Sterilization was more prevalent among women with four years of education (23 percent) than among those with less or more education. The pattern for the males was mixed, but the data do not show male sterilization rates by male educational levels, which may be different from those of their wives. Thus, Table 8.2 indicates some of the correlates of sterilization in Thailand. It would be instructive to examine the determinants of female and male sterilization using multivariate analysis. Such analysis would require data on the date of the last wanted birth, as well as contraceptive, birth, and marital histories.

DATA AND METHODS

The sample for the present analysis was restricted to 4,755 currently married women 15–44 years of age who were not pregnant and not relying upon sterilization (female or male) to prevent pregnancy. Women no longer married (i.e., widowed, divorced, or separated from their husbands) were considered separately and are discussed later in the chapter.

The dependent variable was contraceptive choice, a categorical variable with a limited number of outcomes. Polytomous logit regression was used as the statistical technique to avoid problems of heteroskedasticity and to allow for joint outcomes of separate events (Hanushek and Jackson 1977). The dependent variable was classified into one of three categories: (1) pill, IUD, and injectables (the most effective and noncoital contraceptives); (2) other methods (less effective or coitus-related contraceptives); and (3) nonuse. The independent variables were age, rural versus urban residence, years of education, labor force status, parity (number of children ever born), and a constructed variable representing region, religion, and language. Age

Table 8.2. Percentage of currently married women 15-44 years of age using sterilization (female or male), by urban-rural residence, region, religion, language, and education: Thailand, 1984

Characteristic	% using sterilization			N
	Female	Male	Both methods ^a	
Urban-rural residence				
Bangkok	26	6	32	1,226
Provincial urban	27	2	30	504
Rural	20	4	24	4,751
All areas	22	4	26	6,481
Region and religion				
Central Region	24	6	30	2,440
Muslim	14	3	18	117
Buddhist	25	6	31	2,323
Southern Region	13	3	16	1,486
Muslim	4	1	4	666
Yawee-speaking	2	0	2	462
Thai-speaking	6	2	8	204
Buddhist	20	5	25	820
Northern Region, Buddhist	22	6	28	1,213
Northeastern Region, Buddhist	27	1	28	1,298
All regions	22	4	26	6,437
Years of education				
0	19	4	23	465
1-3	21	3	24	300
4	23	4	27	4,366
5-10	20	4	23	878
11+	18	6	24	472
All educational levels	22	4	26	6,481

Source: CPS3.

^aPercentages for male and female methods may not sum exactly to percentages for both methods because of rounding.

was measured continuously; the other variables were categorical and represented by sets of dummy variables. Their measurement is discussed in the results section.

We tested a variety of models. For example, parity was tested as a continuous, then as a categorical, variable, and the latter provided the better fit. Several interactions, such as age and parity, were also tested but were not found to be significant. The best-fitting model presented here includes

all of the main-effects variables and a term for age squared, to account for the curvilinear relationship between age and contraceptive usage.

RESULTS

Covariates of Use among Currently Married Women

The results for the logit regressions (beta coefficients) are shown in Table 8.3. The first part of the multivariate analysis presents the actual beta coefficients from the polytomous logit regression equation. The beta coefficients represent the log-odds of being in one category relative to being in another specified category. Because these coefficients do not have a linear metric, it is useful to relate them in terms of their log-odds.

For example, the beta coefficient in Table 8.3 for pill, IUD, or injectables versus nonuse for the education category of four years is .31. This means that women with four years of education were 1.36 times more likely to use the pill, IUD, or an injectable than to use no method, as compared with women with one to three years of education. A negative sign indicates the reverse likelihood of being in one category than in the other. Thus, the beta coefficient for women with no formal education using the pill, IUD, or injectables versus nonuse (-.14) means that these women were .86 times more likely to use no method than to use the pill, IUD, or an injectable, as compared with women with one to three years of education. Each of the categorical variables should be interpreted relative to the reference category for that variable.

The second portion of the multivariate analysis presents the estimated probability of being in each of the categories of the dependent variable, holding all other variables constant at their mean. The estimated probabilities, which are presented as percentages, provide a means to interpret the beta coefficients, as the latter do not have any intuitive value and are difficult to interpret. These percentages do not represent actual distributions of the population, but rather indicate the distribution of persons in specified groups when all other variables were held constant at their mean.

It should be emphasized that this model predicts contraceptive choice for nonpermanent methods. If sterilization had been included as a method choice, a very different picture might have emerged. In the discussion that follows, we discuss the relationship of each independent variable with method choice, starting with age.

The age patterns are illuminated in the first panel of Table 8.4, which shows the predicted distribution of methods used for selected characteristics of currently married women, holding the other variables constant at their mean. The use of less effective or coital ("other") methods was slightly higher (8 percent) among women of age 40 than among 20-year-olds (4 percent). At age 20, 48 percent of women used the pill, IUD, or injectables as

Table 8.3. Polytomous logit results (betas) for contraceptive choice among currently married women: Thailand, 1984

Independent variable	Pill, IUD, or injectable versus nonuse	Other methods versus nonuse	Pill, IUD, or injectable versus other methods
Age	.07	.20*	-.12
Age ²	.00†	-.00*	.00
Rural/urban residence (Reference category = Bangkok)			
Other urban	.26	-.77†	1.03†
Rural	.14	-.89†	1.01†
Region, religion, language (Reference category = Central Region, Buddhist)			
Central Region, Muslim	-.45*	-.77	.32
Southern Region, Muslim, Yawee-speaking	-2.18†	.23	-2.41†
Southern Region, Muslim, Thai-speaking	-1.14†	.71*	-1.84†
Southern Region, Buddhist	-.89†	.78†	-1.68†
Northern Region, Buddhist	-.46†	-.44	-.02
Northeastern Region, Buddhist	.38†	-.11	.50*
Education (Reference category = 1-3 years)			
No formal education	-.14	-.11	-.03
4 years	.31	.65	-.35
5+ years	.37*	1.53†	-1.16†
Labor force status (Reference category = not in labor force)			
In farming employment	.05	.01	.03
In nonfarming employment	.07	.06	.01
Parity (Reference category = 2-4 children)			
0	-2.39†	-1.76†	-.63*
1	-.47†	-.35*	-.12
5+	.14	-.21	.35
Constant	-.47	-4.88	4.41
Model chi-square	918.8		
N	4,755		

* $p < .05$.† $p < .01$.

Table 8.4. Expected percentage distribution of current contraceptive use among currently married women, by selected characteristics: Thailand, 1984

Characteristic	Method		
	Pill, IUD, injectable	Other	Nonuse
Age			
20	48	4	47
25	46	6	47
30	43	7	50
35	38	8	54
40	31	8	61
Residence			
Bangkok	36	13	51
Other urban	42	6	52
Rural	45	6	49
Region, religion, and language			
Central Region, Muslim	42	3	55
Central Region, Buddhist	52	5	43
Southern Region, Muslim			
Yawee-speaking	10	12	78
Thai-speaking	23	15	61
Southern Region, Buddhist	28	16	57
Northern Region, Buddhist	41	4	55
Northeastern Region, Buddhist	61	4	35
Education (years)			
0	33	3	63
1-3	36	4	60
4	43	6	51
5+	41	13	46
Parity			
0	9	3	88
1	38	6	55
2-4	49	7	44
5+	53	6	41

compared with 47 percent not using any method. At age 40, however, there was a much greater divergence, with 61 percent of the women not using any method and only 31 percent using the most effective methods. This pattern of greater nonuse at older ages was probably due to a combination of older women's choosing sterilization or having decreased fecundity and younger women being the most knowledgeable and therefore most likely to adopt modern methods.

Knodel and Debavalya (1978:39) have noted that the urban-rural difference in contraceptive usage diminished between 1969 and 1975. We expected the choice of contraceptive methods to differ by area, however, depending on the resources available in various areas. For instance, as early as 1965 two Bangkok hospitals were offering family planning services (Thailand, Ministry of Public Health, and Mahidol University 1983:107). The government now makes medical care, including family planning services, available throughout rural areas, but persons seeking contraceptives are limited primarily to the methods provided by the government facilities. Thus, in 1984 contraceptors in rural areas were likely to be using the pill, IUD, or injectables offered by the government health units because they had few alternatives. Notable exceptions were the McCormick Hospital in Chiang Mai and the community-based projects developed by Mechai Viravaidya, secretary-general and founder of the nonprofit Community Development Association.

The logit regression coefficients for urban-rural residence (Table 8.3) indicate that women in urban areas outside Bangkok and in rural areas were more likely to be using no method than to be using the less effective methods, as compared with women in Bangkok. However, if women outside Bangkok *were* users, they were slightly more likely than women in Bangkok to be using the more effective methods.

As seen in the second panel of Table 8.4, use of effective methods was greatest in rural areas. This finding reflects not only the demand for effective contraception among rural women, but also the availability of family planning services throughout rural areas, where 83 percent of contraceptive sources are government-run (Kamnuansilpa and Chamrathirong 1985:table 6.2), and the generally low cost of contraceptives provided through those sources. Women in Bangkok were twice as likely to use less effective methods than were women in other urban or rural areas, probably owing to their greater concern about the long-term effects of the pill, IUD, and injectables. Among all three groups, the level of nonuse was about 50 percent, though it was slightly lower in rural than in urban areas. The vigorous family planning effort in the rural areas, which includes minibuses that transport rural residents to clinics in the district or provincial towns (Knodel and Debavalya 1978:39), probably accounts for the similarity of use rates among rural and urban residents.

Geographic region and religion have been found to be important variables in fertility and contraceptive use in Thailand (Panel on Fertility Determinants, NRC 1982:179.) Of Thailand's four regions, the Central Region is the most advanced economically. The Northeast and the North are poor, the former lacking a good irrigation system and the latter being mountainous and sparsely populated. The South has achieved an intermediate level of development; its economy has benefited from rubber plantations and tin mines. Muslims live primarily in the South. Islam values marriage highly and has a pronatalist orientation (Thomlinson 1971). Buddhism, on the other hand, emphasizes Karma, or individualism, and has no scriptural prescriptions about procreation or contraception. Thus, we expected contraceptive prevalence rates to be higher among Buddhists, particularly those living in the Central Region.

To illuminate regional and religious contraceptive patterns, we used a constructed variable representing region, religion, and language. We were particularly interested in differences in contraceptive use between Muslims and Buddhists in Southern Thailand, where fertility has remained higher and contraceptive prevalence lower than in other regions of the country (IPSR et al. 1985; Pejaranonda and Chamratrithirong 1984). We divided Muslims into three groups: Southern Muslims who spoke Yawee, Southern Muslims who spoke Thai, and all other Muslims, all of whom resided in Bangkok or the Southern Region. (Except for the few Muslims in Bangkok, very small numbers of Muslims live in any region besides the South.) We also classified Buddhists, who make up the vast majority of Thailand's population, by region to permit comparisons between Buddhists and Muslims.

The reference group for the logit regressions (Table 8.3) was Central Region Buddhists. The only group more likely than this group to use the pill, IUD, or injectables was Buddhists in the Northeastern Region—a somewhat surprising finding, considering that the Northeast is such a poor region. The other groups were much more likely to be nonusers. Southern Muslims and Southern Buddhists were the only two groups more likely to use less effective contraceptive methods than were Buddhists in the Central Region. On one hand, among users, Northeastern Buddhists and Central Muslims were the only groups who were more likely to use the pill, IUD, or injectables than other methods, as compared with Central Buddhists. On the other hand, users in the three groups from the Southern Region—Yawee Muslims, Thai Muslims, and Southern Buddhists—were much more likely to use other methods than the pill, IUD, or injectables, as compared with Central Buddhists.

Our analysis revealed a very strong regional effect, with women in the Southern Region most likely to be nonusers (see third panel of Table 8.4). In addition, we found a definite religious factor. As expected, Buddhists

were more likely than Muslims to be users. The greatest effect, however, appears to have been the combination of religion and language. Yawee-speaking Muslim women deviated the most from the other groups, reporting the highest level of nonuse and the lowest level of pill, IUD, and injectable use. The Yawee are also the least integrated into contemporary social change in Thailand.

A positive association between level of education and contraceptive prevalence has been noted in Thailand as elsewhere (Knodel and Debavalya 1978:41,42). But choice of contraceptive use may vary by educational level. Better-educated women may be expected to prefer the most effective methods, but they may also be the most aware of potential side effects of the pill, IUD, and injectables.

We chose as the educational reference group in our sample women with one to three years of education (Table 8.3). Among users at all educational levels, use of the pill, IUD, and injectables was substantially more prevalent than use of the other methods (fourth panel of Table 8.4). Women with at least four years of education were more likely to use both the more effective methods and the other methods than were women with three years of education or less. A larger percentage of women with five or more years of education (13 percent) than of other women were using methods other than the pill, IUD, and injectables, probably because of their greater knowledge and concern over possible harmful side effects of the modern methods, coupled with their desire to use some method of fertility control. This finding has also been reported in Sri Lanka (see Chapter 9) and in the Philippines (Zablan et al. 1988). It appears that in each country women with higher education balance the tradeoffs among side effects, effectiveness, and user satisfaction by choosing less effective methods such as rhythm.

Labor force participation was classified into three groups: working in the farm sector, working in the nonfarm sector, or not in the labor force. Owing to the difficulty of arranging for childcare while in the labor force, we expected that women in the labor force would be more likely than others to be using contraceptives. Surprisingly, virtually no differences in contraceptive use emerged among the three groups (Table 8.3). It is possible that women in the labor force were working only part time, that they were able to care for their children while working, or that their circumstances enabled them to arrange for childcare while they worked. It is not possible to determine childcare arrangements from the CPS3 data. A question on the compatibility between work and childcare in future surveys should yield useful information on this issue.

As couples reach their ideal family size, their use of contraception can be expected to increase. As expected, women in our sample who had no children or only one child were much more likely not to be using contracep-

tion than were women with two to four children (Table 8.3 and last panel of Table 8.4). Only 9 percent of women with no children were using the pill, IUD, or injectables and only 3 percent were using other methods. Thirty-eight percent of the women with one child used the pill, IUD, or injectables. The contraceptive status of women with two to four children and those with five or more children was very similar. This general pattern suggests that Thai women were more likely to be using contraception to terminate childbearing than to space births.

Other Covariates of Contraceptive Use

All of the analyses described thus far involved currently married women, who comprised an overwhelming majority of the sample and were most likely to be at risk of pregnancy. To examine the effect of marital status itself, however, we also ran a model that included women no longer in a marriage union. The magnitudes of beta coefficients for the independent variables were nearly identical to those with only currently married women, suggesting that marital status did not interact with other variables in the model. But the dummy variable for marital status was highly significant. Women who were separated, divorced, or widowed were much more likely than married women to be using no contraceptive method. The coefficient for pill, IUD, and injectable use versus nonuse for women no longer married was -3.13, and for other methods versus nonuse it was -3.89 (data not shown). This pattern of nonuse among separated, divorced, and widowed women is obvious in Table 8.5. Only 4 percent of such women used any method at all, probably because few of these women needed contraceptive protection. The low proportion of users makes them a unique group for future studies. They would be of particular interest if they were found to be at risk of pregnancy or if there should be an increase in marital disruption in Thailand.

Availability and accessibility of services are also important determinants of contraceptive practice, particularly of the choice of methods. As seen in

Table 8.5. Expected percentage distribution of current contraceptive use among women, by method and current marital status: Thailand, 1984

Method	Currently married	Separated, divorced or widowed
Pill, IUD, injectables	41	3
Other methods	7	1
Nonuse	52	96
Total	100	100

Table 8.6, the primary sources of contraception in Thailand, especially in the rural areas, are those organized by the Thai government. In the CPS3 sample, IUDs and female sterilization, for example, were obtained mainly from government sources. But pills and condoms were also supplied by private sources, primarily in the urban areas. Analysis of the determining factors of contraceptive method choice should therefore take into account the sources of specific methods.

Availability and accessibility can also be measured by the travel time to the contraceptive sources. Table 8.7, which provides data from CPS3 on travel time to each source of current methods of contraception, reveals that travel time to undergo a male sterilization was longer than travel time to obtain the pill at the tambol (subdistrict) center. This may explain why many older rural women were still using the pill even though they might have already reached their desired family size. Travel time to the district centers and the district hospitals for female sterilization was also relatively convenient (16 to 20 minutes), which may help explain why female sterilization has increased substantially in the recent past. During the recent past too the government has upgraded some district centers to district hospitals. What is unclear from Table 8.7, however, is whether travel time actually influenced contraceptive choice. In future work it would be helpful to analyze required or perceived travel time to obtain contraceptive methods.

Table 8.8 explores the relationship between methods used and the distance from rural women's villages to specific sources of those methods. The convenience of obtaining pills at the tambol health center may partly explain the acceleration in pill use in rural areas, including its use among

Table 8.6. Expected percentage distribution of contraceptive sources among current users, by rural-urban residence and method: Thailand, 1984

Residence and source	Pill	Con- dom	Inject- able	IUD	Sterilization		All methods
					Female	Male	
Rural							
Government	78	53	74	93	91	77	83
Private	22	47	26	7	9	23	17
Total	100	100	100	100	100	100	100
Urban							
Government	37	16	69	90	83	53	63
Private	63	84	31	10	17	47	37
Total	100	100	100	100	100	100	100

Source: IPSR et al. 1985:table 5.

Table 8.7. Travel time (in minutes) to sources reported by contraceptive users, by current method: Thai women, 1984

Source	Pill	Con- dom	Inject- able	IUD	Sterilization	
					Female	Male
Tambol (subdistrict) center	13	—	12	19	—	14
District center	16	—	17	14	16	—
District hospital	18	—	17	19	20	20
Provincial hospital	—	—	18	11	15	14
Other government hospital	14	—	—	20	19	17
Maternal and child health center	12	—	—	17	14	—
Drugstore	12	11	—	—	—	—
Village volunteer	5	—	—	—	—	—
Mobile unit	—	—	—	—	—	8

Note: The table presents only those sources for which there were at least 20 cases for at least one method. A blank cell represents fewer than 20 cases.

women of older ages. The availability of certain methods at certain sources thus appears to be related to the method choices made by women.

A final issue involves side effects. One would expect that a major determinant of current method choice would be adverse side effects and method satisfaction associated with specific methods. Moreover, different women may experience or perceive side effects differently. Our analysis found that women with more education and women with no formal education tended to experience fewer side effects from all methods than did women with intermediate levels of education (Table 8.9). We suspect that women with no education were more tolerant of side effects and did not complain about them, whereas women with the most education who were using the same methods may have obtained better service or been more able to cope with side effects. Therefore, side effects and satisfaction, which may be very important determinants of contraceptive method choice, need to be studied further, especially with respect to their probable interaction with the socioeconomic characteristics of users. Future analysis should measure users' past experience of side effects with specific methods and their perceptions of side effects associated with methods they have not used.

CONCLUSION

This chapter has discussed various factors that have influenced contraceptive method choice in Thailand. They include socioeconomic and demographic determinants such as age, rural-urban residence, education, labor force status, region, religion, language, and parity. The findings suggest

Table 8.8. Percentage distribution of contraceptive users, by current method, source, and distance from village to district health center: rural Thai women, 1984
(Distance in kilometers)

Method and distance to source	Number of users	Percentage, by source						All sources
		Tambol (subdistrict) health center	District health center	Hospital	Clinic	Drugstore	Other	
Pill								
0-5	207	40	8	23	4	18	7	100
6-10	259	71	2	4	2	14	7	100
11+	444	62	0	3	4	17	14	100
Condom								
0-5	23	26	4	22	0	44	4	100
6-10	14	43	0	14	7	36	0	100
11+	16	25	0	13	0	56	6	100
Injectable								
0-5	95	21	3	41	32	1	2	100
6-10	99	48	0	35	15	0	2	100
11+	185	42	0	24	23	1	9	100
IUD								
0-5	44	7	2	68	21	0	2	100
6-10	52	17	10	50	19	0	4	100
11+	97	8	5	75	8	0	3	100
Female sterilization								
0-5	213	1	3	83	14	0	0	100
6-10	217	0	3	86	11	0	0	100
11+	483	1	4	84	12	0	0	100
Vasectomy								
0-5	30	0	7	60	17	0	17	100
6-10	55	14	4	48	23	0	11	100
11+	97	19	1	48	13	1	18	100

Note: Percentages may not sum exactly to 100 because of rounding.

Table 8.9. Percentage distribution of contraceptive users, by education, current method, and first-mentioned problem with method: Thai women, 1984

Years of education and problem	Pill	Con- dom	IUD	Sterilization		Inject- able
				Female	Male	
No formal education						
No problem	61	—	87	69	67	68
Medical or health problem	18	—	7	22	25	25
Headache, dizziness	16	—	*	7	*	7
Emotional problem	4	—	*	2	8	*
Other	*	—	6	*	*	*
Total	100	—	100	100	100	100
(N)	(63)	—	(20)	(87)	(16)	(21)
1-3 years						
No problem	46	—	50	55	—	44
Medical or health problem	30	—	32	20	—	47
Headache, dizziness	20	—	18	16	—	*
Emotional problem	4	—	*	4	—	9
Other	*	—	*	5	—	*
Total	100	—	100	100	—	100
(N)	(57)	—	(13)	(66)	—	(13)
4 years						
No problem	60	94	73	63	75	65
Medical or health problem	19	*	22	23	12	28
Headache, dizziness	18	*	4	8	5	6
Emotional problem	3	*	1	5	4	1
Other	*	6	*	1	4	*
Total	100	100	100	100	100	100
(N)	(933)	(57)	(239)	(1,119)	(206)	(352)
5+ years						
No problem	63	92	68	79	90	49
Medical or health problem	20	*	32	15	*	39
Headache, dizziness	15	*	*	3	*	10
Emotional problem	2	*	*	3	9	2
Other	*	8	1	1	*	*
Total	100	100	100	100	100	100
(N)	(200)	(52)	(41)	(215)	(46)	(92)

Note: A blank cell represents fewer than 10 cases. Percentages may not sum exactly to 100 because of rounding.

*0.5 percent or less.

policy issues likely to affect the need for contraceptives and recruitment of new acceptors into the national family planning program. One finding in particular is that Muslims and Southern Thais were continuing to use traditional and less effective methods or no method rather than modern methods. This was the case regardless of other socioeconomic factors. Another group who appeared to be resisting modern methods was women with no formal education. As program acceptance within Thailand approaches its likely maximum, the national program may want to target these two groups for information on modern contraceptives.

The government program has been quite successful in rural areas. By 1984 there were no differences between Bangkok and other urban areas, or between Bangkok and rural areas, in the proportion of women using modern methods of contraception. The negligible use of coital methods in rural areas indicates the effectiveness of the government program in providing noncoital methods, which are distributed primarily at the government clinics and hospitals. These important findings should encourage continued support of the government facilities in the rural areas.

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9 Traditional Contraception in Sri Lanka

by Indra Gajanayake

Sri Lanka is a developing country with low per capita income, where fertility has declined considerably in recent years. The crude birth rate, which was 38.1 births per thousand persons in the period 1951-55, fell to 28.7 during 1971-74 and was reduced still further, to 28.0, in 1981. The fertility decline between 1953 and 1969 was brought about largely by rising age at marriage and declining proportions of women marrying (Jayewardene and Selvaratnam 1967; Wright 1968; Fernando 1972). Marital fertility changed little between 1953 and 1963 (Wright 1968:749). Age-specific fertility declined between 1963 and 1971 in almost all age groups and continued to decrease through 1981 in every age group (De Silva et al. 1986:5). Duration-specific marital fertility fell between 1960 and 1975, decreasing by 15 percent between 1965-70 and 1970-75 alone (Alam and Cleland 1981:42). Total fertility of currently married women decreased from 6.3 children per woman in 1975 to 5.8 in 1982; the proportion of fourth or higher-order births declined during the same period (Sri Lanka, Department of Census and Statistics 1983:31-32). Thus, Sri Lanka's fertility transition has followed the typical pattern, with rising age at marriage being the more important factor at first and declining marital fertility becoming more important in later years.

Plausible explanations for the decline in marital fertility include such sociodemographic factors as high female literacy and mass education (Caldwell 1980), decreasing infant mortality (Preston 1978), and high social welfare standards and aspirations for a better material life, particularly in the face of a worsening economy and increasing unemployment (Alam and Cleland 1981:42). All these factors, however, would have affected fertility through proximate, or intermediate, variables (Davis and Blake 1956; Bongaarts 1985), of which contraception has been by far the most important in Sri Lanka's fertility transition.

Available evidence indicates, surprisingly, that the decline in marital fertility had already started before the national family planning program could have had much impact (Alam and Cleland 1981:42). Before the program became active in 1968, small-scale organized family planning activities were taking place with Swedish aid, under the auspices of the Family Planning Association. The Sweden-Ceylon family planning project distributed foam tablets, diaphragms, and spermicide jelly to a small fraction of the population and provided advice to the users of foam tablets on how to determine the safe period (Kinch 1962:95). Data from the Sri Lanka Fertility Survey

in 1975 showed that two-thirds of currently married women who had ever used the major modern methods of contraception (sterilization, the pill, loop, and condom) had first used at least one of these methods between 1971 and 1975 (Immerwahr 1981:17). Traditional, nonappliance methods were probably the major means by which couples in Sri Lanka began to control their fertility.

This chapter focuses on the use of traditional contraceptive methods in Sri Lanka, investigating the levels and trends of traditional method use, the contribution of traditional methods to the fertility decline, the reasons for the continued widespread use of traditional methods, and the socio-demographic factors that have influenced traditional method use. The data come from the Sri Lanka Fertility Survey (SLFS) of 1975, Sri Lanka's contribution to the World Fertility Survey; the Contraceptive Prevalence Survey (CPS) of 1982; the Family Health Impact Survey of 1981-82; contraceptive knowledge, attitude, and practice (KAP) and fertility surveys conducted in the mid-1960s and early 1970s; and a recent evaluation of family planning (Devendra 1985). The SLFS and the CPS were designed to be nationally representative and used very similar methods of sample selection and data collection. Data from the two surveys are therefore comparable.

LEVELS AND TRENDS OF TRADITIONAL METHOD USE

Contraceptive prevalence in Sri Lanka rose from 32 percent of currently married women of reproductive age in 1975 to 55 percent by 1982 (Sri Lanka, Department of Census and Statistics 1983:70). The increase can be attributed to nearly equal increases in the prevalence of modern and of traditional methods (Table 9.1). The rise in modern method use, however, was due

Table 9.1. Percentage of currently married women of reproductive age using contraception, by method: Sri Lanka Fertility Survey (SLFS), 1975, and Contraceptive Prevalence Survey (CPS), 1982

Method	SLFS, 1975	CPS, 1982	Difference
All methods	32	55	23
Modern temporary methods ^a	9	10	1
Sterilization (female and male)	10	21	11
Traditional methods	13	25	11
Rhythm	8	13	5
Withdrawal	1	5	3
Other traditional	4	7	3
Number of women	6,159	4,163	

Source: Sri Lanka, Department of Census and Statistics (1983:table 6.5, p. 70).

Note: Percentages may not sum to totals because of rounding.

^aModern temporary methods include the pill, IUD, condom, injectable, and vaginal methods.

almost entirely to an increase in sterilization acceptance.

Since traditional methods are considered to be less effective, one would expect that wider access to modern contraceptives would result in reduced reliance on traditional methods. This assumption presupposes a decline in the number of rhythm users as a proportion of all users as contraceptive prevalence rises. In Sri Lanka, however, as contraceptive prevalence rose between 1975 and 1982, rhythm's share declined only from 25 to 24 percent, and the share of all traditional methods actually increased from 41 to 45 percent (Table 9.1). These figures suggest that the government's family planning program has not been very effective in promoting the use of modern contraception in place of traditional methods.

Of the traditional methods listed in the two surveys, rhythm was the most prevalent and withdrawal the least. In the SLFS abstinence was specifically mentioned in the questionnaire, and it makes up 95 percent of the "other" category in Table 9.1. In the CPS, however, abstinence was not mentioned specifically but was recorded in the "other" category if spontaneously reported by the respondent. Even so, the figures suggest a considerable increase in the prevalence of abstinence between 1975 and 1982.

There is evidence that traditional method users relied on more than one such method. Of the 65 respondents reporting multiple method use in the Family Health Impact Survey, 66 percent relied on rhythm and withdrawal, 26 percent on condoms and rhythm, and nearly 8 percent on a different method mix such as withdrawal and condoms (Sri Lanka, Family Health Bureau 1984:43). Some CPS respondents, therefore, may have reported using the method they felt least inhibited talking about. Prevalence of rhythm, withdrawal, and other traditional methods would not thus necessarily reflect mutually exclusive method choices.

A typical survey does not uncover the prevalence of infrequent sexual relations or permanent abstinence among older couples, and most respondents in that category are probably classified as noncontraceptors. A good indication of this in the CPS is that 34 percent of all currently married, non-pregnant nonusers between ages 15 and 49 reported that they had no fear of pregnancy (Sri Lanka, Department of Census and Statistics 1983:81). Prevalence of traditional methods would then be considerably underestimated.

Modern contraceptive methods had a slight edge over traditional means in method share, and sterilization accounted for 59 percent of modern contraception. Both the SLFS and the CPS recorded a clear preference for traditional methods over modern temporary methods.

Users of traditional methods may not necessarily continue with the same method; their choice may change over time. Although half of all contraceptors in the SLFS initially chose a traditional method, mainly rhythm (Table 9.2), only about 40 percent of those acceptors were using the same method

Table 9.2. Percentage distribution of ever-users, by method first used and residence: Sri Lanka Fertility Survey, 1975

Method	Residence			Total
	Urban	Rural	Estate	
Modern temporary methods	40	34	45	36
Sterilization	15	12	28	14
Traditional methods				
Rhythm	32	35	2	32
Withdrawal	5	6	4	5
Abstinence	8	14	22	12
Number of ever-users	906	1,779	105	2,790

Note: Percentages may not sum exactly to 100 because of rounding.

at the time of the survey (Table 9.3).¹ Rural and urban users of traditional methods preferred rhythm as the first method, whereas estate contraceptors opted for abstinence. Rural women tended to continue with abstinence rather than with rhythm or withdrawal, whereas urban women tended to continue using withdrawal.

As a subsequent choice, traditional methods were much less favored than modern methods. Among the traditional methods, however, abstinence and withdrawal attracted more contraceptors than did rhythm (Table 9.4). This was true for both urban and rural women.

TRADITIONAL METHOD USE AND FERTILITY DECLINE

Given the continued popularity of traditional methods, an important question having policy implications is whether traditional methods have made a substantial contribution to Sri Lanka's fertility decline. The answer is affirmative, in light of findings from earlier studies, to which we now turn.

A survey in the early 1960s of 8,043 families representative of the major demographic areas of the country revealed fairly high levels of knowledge and use of traditional family planning methods (Abhayaratne and Jayewardene 1967). Fifty-four percent of respondents reported knowing about family planning, and 64 percent of those who professed knowledge mentioned all of the methods: abstinence, natural means by husband (withdrawal) natural means by wife (rhythm), mechanical means by husband (condom), mechanical means by wife (diaphragm, foam tablets, spermicidal jelly, or oral pills), male sterilization, and female sterilization.

1. The analysis is limited in that duration since first acceptance was not recorded. Moreover, the percentages may underestimate actual continuation rates because some spacers might have discontinued a method to have another child.

Table 9.3. Number of contraceptors, by first method used and residence, and percentage of contraceptors currently using first method, by residence: Sri Lanka Fertility Survey, 1975

Method	Residence			Total
	Urban	Rural	Estate	
Modern temporary methods				
<i>N</i> first using	365	599	47	1,011
% currently using	31	35	23	33
Traditional methods				
Rhythm				
<i>N</i> first using	288	618	2	908
% currently using	41	40	ne	40
Abstinence				
<i>N</i> first using	43	105	4	152
% currently using	37	43	ne	41
Withdrawal				
<i>N</i> first using	71	243	23	337
% currently using	51	40	ne	43
All temporary methods				
<i>N</i> first using	767	1,565	76	2,408
% currently using	37	38	36	38

ne—not estimated because of small number.

Most commonly mentioned were rhythm (75 percent) and female sterilization (74 percent). Abstinence and withdrawal were well known too, mentioned by 66 and 72 percent, respectively, of those who claimed to know about family planning (Abhayaratne and Jayewardene, 1967:281). Rhythm had been used by 21 percent, withdrawal by 20 percent, and more than any one method by 15 percent of all respondents. Modern methods—the condom, diaphragm, foam, jelly, orals, and sterilization—were already available, and the intrauterine device (IUD) was just being introduced into the country at that time. Respondents reported having ever used condoms (20 percent); the diaphragm, foam, jelly, or orals (23 percent); and sterilization (2 percent) (Abhayaratne and Jayewardene 1967:285).

A recent evaluation of family planning in Sri Lanka, based on data from the Family Health Impact Survey of 1981–82, indicates that 30 percent of about 140,000 births averted in 1981 were averted by nonprogram contraception (Devendra 1985:213). Data from the survey reveal also that, among married women 15–49 years old and at risk of pregnancy, 14 percent were using traditional methods, only 2.5 percent were using the pill, and only 3 percent were using the condom (Sri Lanka, Family Health Bureau 1984:36). Only 12.1 percent of the current users of modern methods obtained their supplies from nonprogram sources, the pill and the condom being the two

Table 9.4. Number of contraceptors, by current method used and residence, and percentage of contraceptors currently using a method different from their first method, by residence: Sri Lanka Fertility Survey, 1975

Method	Residence			
	Urban	Rural	Estate	Total
Modern temporary methods				
<i>N</i> currently using method	170	340	16	526
% currently using a method different from their first method	33	39	ne	37
Sterilization				
Female				
<i>N</i> currently using method	227	338	24	589
% currently using a method different from their first method	40	39	ne	38
Male				
<i>N</i> currently using method	9	12	18	39
% currently using a method different from their first method	ne	ne	ne	44
Traditional methods				
Rhythm				
<i>N</i> currently using method	139	285	1	425
% currently using a method different from their first method	14	14	ne	14
Abstinence				
<i>N</i> currently using method	54	126	15	195
% currently using a method different from their first method	33	23	ne	26
Withdrawal				
<i>N</i> currently using method	21	60	2	83
% currently using a method different from their first method	ne	25	ne	24
All methods				
<i>N</i> currently using method	620	1,161	76	1,857
% currently using a method different from their first method	32	89	26	31

ne—not estimated because of small number.

modern methods most widely accepted from nonprogram sources (Sri Lanka, Family Health Bureau 1984:64). It is therefore reasonable to infer that use of traditional methods averted a substantial number of births. Likewise, the decline in marital fertility in the late 1960s, when use of traditional methods was high but modern contraceptives were not widely available, and the continued decline in later years, when many couples still chose traditional methods despite the increasing availability of modern contraceptives, suggest that traditional methods have made an important contribution to the fertility transition in Sri Lanka.

POSSIBLE REASONS FOR TRADITIONAL METHOD USE

Why has use of traditional methods remained widespread in a technologically progressive era? Several factors seem to be responsible.

Lack of knowledge about modern methods does not appear to be a significant factor. The Sri Lankan government and the Family Planning Association have greatly facilitated the spread of knowledge and use of contraception in the country. In 1982, 99 percent of ever-married women between ages 15 and 49 knew of at least one family planning method, 8 percent more than in 1975 (Sri Lanka, Department of Census and Statistics 1983:53). More women knew about modern methods than about traditional methods, both before and after prompting (Table 9.5). Prompting substantially increased the proportions of women who said they knew about each method. Such a disparity could arise from reluctance to discuss matters related to sex or because the respondents associated contraception with modern methods only.

Table 9.5. Percentage of ever-married women having knowledge of specific contraceptive methods with and without prompting: Sri Lanka Contraceptive Prevalence Survey, 1982

Method	Unprompted	Prompted	Total
Any method	—	—	99
Pill	67	23	90
Condom	29	44	73
IUD	49	30	79
Female sterilization	72	26	98
Male sterilization	34	50	84
Injectable	27	45	72
Rhythm	12	48	60
Withdrawal	3	31	34
Vaginal methods	2	7	9

Source: Sri Lanka, Department of Census and Statistics (1983:table 5.1)

A high prevalence of traditional contraception despite widespread knowledge of modern methods naturally raises questions about the availability of modern contraceptives. Again, availability does not seem to be the reason for the high prevalence of traditional methods. A very high proportion—97 percent—of all nonusers of modern contraception (users of traditional methods and those who had never used any contraception) knew of a source of at least one modern method (Sri Lanka, Department of Census and Statistics 1983:82). A nationwide network of hospitals provides sterilization services, runs clinics, and has contraceptive sales outlets. The Family Planning Association runs clinics and mobile services, and private medical practitioners—allopathic and ayurvedic—provide contraceptive counseling and services. Commercial outlets sell pills, condoms, and foam tablets under the auspices of the country's social marketing program.

Women need not go out of their way to obtain pills or condoms. Family health workers issue supplies during their routine home visits, and public health inspectors issue condoms. (In 1981 each family health worker was responsible for an area containing 3,000 to 8,000 inhabitants.) Family health workers also refer prospective clients to clinics or hospitals for IUD insertions or sterilization.

Effective knowledge of a supply source, measured as the proportion of women knowing where to obtain a modern method among nonusers of modern contraception, was very high in 1982. Effective knowledge of at least one method was 97 percent; knowledge of modern temporary methods was somewhat lower but not less than 77 percent (Sri Lanka, Department of Census and Statistics 1983:82).

Estimated travel times to sources of modern contraceptives were not generally higher for nonusers than for users of specific methods. In fact, a higher percentage of nonusers estimated travel time to various sources to be less than 30 minutes (Table 9.6). As anticipated, urban women in each method category reported less travel time than their rural counterparts.

Also as expected, urban women reported greater convenience in reaching method sources, and the perceived convenience of obtaining each method, except for the IUD, was lower among nonusers than among users (Table 9.7). But the differences between users and nonusers in the perceived convenience of modern temporary methods were small. Thus, the rather low prevalence of such methods cannot be attributed entirely to their perceived nonaccessibility.

The financial cost of supply methods could discourage their use. In Sri Lanka only sterilization and the IUD are available free of charge. Other modern contraceptives cost money but are heavily subsidized. In 1976 the charges were equivalent to US 10 cents per cycle of orals, 1 cent per condom or foam tablet, and 21 cents per diaphragm (Nortman and Hofstatter 1980:42). Though by international standards these costs are negligible, to

Table 9.6. Percentage distribution of current contraceptive users and nonusers, by residence and travel time to a source of a specific method: Sri Lanka Contraceptive Prevalence Survey, 1982

Residence and travel time (in minutes)	Pill		Condom		IUD		Sterilization				Injectable	
							Female		Male			
	Users	Non-users	Users	Non-users	Users	Non-users	Users	Non-users	Users	Non-users	Users	Non-users
Urban and rural												
<30	66	72	80	82	42	55	27	36	36	38	48	57
30-60	17	16	14	11	30	22	23	26	29	25	21	22
>60	16	12	2	6	28	23	49	39	34	36	30	20
DK	1	0	3	0	0	0	0	0	1	0	0	0
Urban												
<30	86	88	88	93	76*	76	58	64	38*	66	68*	78
30-60	6*	8	8*	4	24*	17	23	24	38*	23	27*	15*
>60	6*	4	0	2*	0	8	19	12	24*	11	4*	7*
DK	3*	0	4*	0	0	0	0	0	0	0	0	0
Rural ^a												
<30	57	67	76	78	35	47	18	27	36	29	35*	50
30-60	23*	19	18*	14	32	24	23	26	28	26	18*	25
>60	20*	14	4*	8	34	29	59	47	35	45	47*	25
DK	0	0	3	0	0	0	0	0	2*	0	0	0

Source: Sri Lanka, Department of Census and Statistics (1983:tables 7.8, 7.9)

DK—Don't know or not sure.

*Fewer than 25 respondents.

^aIncludes estate residents.

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Table 9.7. Percentage distribution of current contraceptive users and nonusers, by residence and perceived convenience in getting to the source of a specific method: Sri Lanka Contraceptive Prevalence Survey, 1982

Residence and perceived convenience	Sterilization											
	Pill		Condom		IUD		Female		Male		Injectable	
	Users	Non- users	Users	Non- users	Users	Non- users	Users	Non- users	Users	Non- users	Users	Non- users
Urban and Rural												
Convenient	86	79	95	82	74	76	68	68	70	69	79	77
Inconvenient	14*	21	3*	17	26	24	32	32	29	31	21*	23
Don't know	0	0*	2*	1	0	0*	0	0*	1*	0*	0	0*
Urban												
Convenient	92	93	98	94	94*	92	89	89	91*	90	96*	94
Inconvenient	8*	7	0	4*	6	8	11*	10	10*	10	4*	6
Don't know	0	0*	2*	2*	0	0*	0	0*	0	0	0	0
Rural ^a												
Convenient	82	74	94	78	70	70	62	61	67	62*	68	71
Inconvenient	18*	26	5*	21	30	30	38	39	32	38*	32	28
Don't know	0	0*	1*	1*	0	0	0	0*	1*	0*	0	0*

Source: Sri Lanka, Department of Census and Statistics 1983:tables 7.10, 7.11.

*Fewer than 25 women.

^aIncludes estate residents.

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many couples in Sri Lanka, where the per capita gross national product (GNP) is now around US \$320 and was only \$190 in 1978, even these modest charges would be a financial burden.

This point is made clearer if one compares Sri Lanka with the Republic of Korea and Thailand. Despite an estimated per capita GNP in Korea of about \$1,160 in 1978, orals and condoms were distributed at the same price as in Sri Lanka; sterilization and IUDs were available free of charge (Nortman and Hofstatter 1980:42). Only 9 percent of at-risk Korean couples were using inefficient contraceptive methods, compared with 16 percent in Sri Lanka (Lightbourne 1980:64). In Thailand, where the per capita GNP in 1978 was \$490, only 4 percent of exposed couples were using inefficient methods, and the proportion using efficient methods was much higher than in Sri Lanka. Contraceptive supplies and services in Thailand were priced much higher than in Sri Lanka, but they were available free of charge at all rural outlets (Nortman and Hofstatter 1980:42). The high levels of traditional method use in Sri Lanka may thus be due to an unmet demand for free modern method supplies and services.

What is puzzling is that, at the individual level, use of traditional methods increases with income in Sri Lanka (Table 9.8). It is likely that this is a spurious relationship arising from the positive association of income with education, and in turn the positive association of education with traditional method use, but this hypothesis cannot be verified because of data limitations.

People's attitudes toward family planning are central to the issue of contraceptive method choice. Two small-scale KAP surveys in 1973 of 300 men and 300 women provide an insight into this aspect. Commissioned by the

Table 9.8. Percentage of married women 15-49 years of age currently using contraception, by family income and type of method: Sri Lanka, 1981-82

Monthly income (rupees)	Type of method			Number of women
	Modern	Traditional	Total	
< 300	33	12	45	1,892
300-600	34	13	46	1,692
600-1,000	37	15	52	544
> 1,000	36	24	59	427
Total	34	14	48	4,555

Source: Sri Lanka, Family Health Bureau (1984:table 4.18).

International Planned Parenthood Federation's Indian Ocean Regional Office, the surveys were conducted by the Market Research Division of Lever Brothers Ltd. The samples were composed mostly of Sinhalese Buddhists, the major ethnic and religious group in the country. The findings reported here are unpublished.

Of the men, 43 percent were using rhythm and 24 percent were using withdrawal. A majority of the rhythm users—65 percent—considered the method to be very good or good, 30 percent were noncommittal, and 5 percent considered it bad or very bad. In contrast, 62 percent of withdrawal users did not respond to the question about the method's quality, and the others were more or less equally divided between those who thought the method was good or very good and those who thought it was bad or very bad. Thus, these men clearly preferred rhythm to withdrawal.

The reasons given by most men who rated rhythm or withdrawal positively were that the method was reliable and it was safe. Those who characterized rhythm or withdrawal negatively believed the method was not safe or reliable.

Among surveyed women (ever-married women below age 45), 20 percent reported current use of rhythm and 15 percent reported current use of withdrawal. (The disparity between men and women in the reported prevalence of rhythm and withdrawal suggests reticence to discuss these methods on the part of the women.) About one-half of the rhythm users had used the method for more than three years, compared with one-third of withdrawal users. In contrast to the men, a large majority of women rhythm and withdrawal users—85 and 73 percent, respectively—rated these methods as either good or very good and gave as their reasons that the methods were safe and reliable.

Women were asked, "How did you come to use the safe period [rhythm] or withdrawal?" About 58 percent of rhythm users responded that they had done so "on another's advice," and that the informant or informants had been a midwife, clinic authorities, husband, elders, friends, or neighbors. Sixty percent of the women using withdrawal had come to use the method on another's advice, three in four on their husbands' advice. Fewer had done so on the advice of a midwife or friend, and fewer still had obtained their information from books.

The male respondents were asked, "Is family planning possible without using contraceptive devices?" Sixty percent responded positively, 20 percent replied in the negative, and the others were noncommittal.

These findings indicate that couples in the majority community in Sri Lanka favor traditional contraception, especially the rhythm method. Interpersonal communication has played a major role in disseminating information on traditional method use.

SOCIODEMOGRAPHIC DETERMINANTS OF TRADITIONAL METHOD USE: EVIDENCE FROM THE CPS

Since sterilization is readily available in Sri Lanka for couples who wish to terminate childbearing, it is possible that methods, particularly rhythm and withdrawal, are used primarily to space births. Cross-national studies have found that more spacers than limiters use rhythm (Liskin 1981:60). If this is so in Sri Lanka, younger women and those with fewer children may be expected to favor traditional methods more than would older women and mothers with more living children. Conversely, older women may be more likely than younger women to use traditional methods because of their greater adherence to tradition. Cultural values that affect family size and composition may have an indirect influence on method choice through couples' decisions to space or end childbearing, and they may affect adherence to or departure from traditional norms of behavior. Higher socioeconomic status has been found to have an important positive effect on contraceptive use in many developing countries (UN, Department of International Economic and Social Affairs 1981:82-111). Since urban women of higher socioeconomic status are generally more ready to accept family planning than other women, they may also be more willing to use modern methods. Rural women of lower socioeconomic status, on the other hand, may be reluctant to give up traditional methods.

Data and Methods

To test these hypotheses, I analyzed differentials in traditional method practice, using aggregate data from the Contraceptive Prevalence Survey of 1982. The data, gathered by the Department of Census and Statistics, were in the form of cross-tabulations of frequencies, which constrained the choice of variables and the scope of analysis. It was possible, however, to make use of the Generalized Linear Interactive Modeling (GLIM) package to fit logit-linear models to the proportions of contracepting women currently using traditional methods.

The analysis assessed the effects of women's current age, number of living children, urban-rural residence, education, and ethnicity on traditional method use. The last two variables were assessed one at a time because of the data limitations. The dependent variable was the proportion of current contraceptors using traditional methods. No attempt was made to distinguish rhythm, withdrawal, abstinence, and other methods because it would have been futile in the event of multiple method use.

The effects of age, number of living children, and urban-rural residence were each examined first without any controls, and then with controls for the other two variables. It was necessary to merge some categories of age and number of children to avoid empty cells and very small cell frequen-

cies; the categories used are clear from the tables presented in the results section. I ignored second- and higher-order interactions; first-order interactions proved not to be statistically significant.

Stepwise ordering of the variables showed that significant effects were not limited to "satisfactory" models. This result is consistent with previous analyses of demographic and socioeconomic differentials in contraceptive practice, which failed to explain a high proportion of its total variance (UN, Department of International Economic and Social Affairs 1981:107). For this reason and for parsimony, the following sections discuss significant effects of factors, whether or not the model was satisfactory. Deviances from the relevant models are presented in Appendix Table 9.1.

Results

Women's age. The curvilinear relationship between age and current contraceptive use among all married women peaked at ages 35–39 for modern methods, whereas for traditional methods it peaked at ages 30–34 and remained high until age 45 (Sri Lanka, Department of Census and Statistics 1983:76). Traditional method use among current contraceptors, however, peaked in the two extreme age groups (Table 9.9). These patterns indicate a preference for traditional methods at the early reproductive ages (under age 25), nearly equal acceptability of modern and traditional methods in the middle years of the reproductive career (ages 25–44), and a preference for traditional contraception again in the later childbearing years (ages 45 and over).

It is evident from Table 9.10 that age (AGE) exerted an effect on the use of traditional methods through the number of living children (LICH) and urban–rural residence (UR). The youngest age group initially seemed to have a higher propensity than older age groups to use traditional contraception, but when urban–rural residence and the number of children were controlled, the older groups showed higher propensities to use traditional methods. After the controls, there was little difference in the prevalence of traditional method use among women in their 20s. From ages 25–29 to 30–34, however, the odds in favor of traditional method use increased by 40 percent. Likewise, among women 40 or older, the odds in favor of traditional method use was 56 percent more than in the age group 35–39. This pattern can be explained by their greater adherence to tradition, apart from being somewhat less informed about modern methods.

Number of living children. The number of living children also influenced the type of contraception used. Among current contraceptors, traditional methods were most prevalent (74 percent) among women with one or no children, and somewhat less prevalent (55 percent) among those with only two children (Table 9.9) Only about 36 percent of contraceptors with at least three living children were using traditional methods. Statistically signifi-

Table 9.9. Percentage of current contraceptors using traditional methods and total number of current contraceptors, by education, ethnicity, residence, age, and number of living children: Sri Lanka Contraceptive Prevalence Survey, 1982

Background variable	%	Total number of current contraceptors
Age		
<25	61	295
25-29	45	427
30-34	48	445
35-39	44	321
40-44	49	150
45+	65	52
Number of living children		
0-1	74	361
2	55	474
3	36	497
4+	35	358
Residence		
Urban	48	462
Rural	50	1,228
Education		
No formal	42	134
Primary	47	473
Secondary or higher	51	1,099
Ethnicity		
Sinhala	53	1,288
Sri Lankan Tamil	47	127
Indian Tamil	29	95
Moor or Malay	35	65

cant effects of family size persisted even after age and urban-rural residence were controlled (Table 9.10). Irrespective of age and urban-rural residence, women with only two living children and those with three living children were significantly less likely to be using traditional methods than women with fewer than two children, having 55 and 80 percent, respectively, lower odds in favor of traditional method use.

Thus, family size played a significant role in the women's preference for traditional methods regardless of their age or urban-rural residence. A preliminary analysis of CPS data revealed that the proportions of currently married fecund women not wanting additional children were 22 percent, 60 percent, and 87 percent, respectively, among those with one, two, and three living children (Sri Lanka, Department of Census and Statistics

1983:44–45). These results suggest that younger women probably used traditional methods for spacing until they achieved their desired family size, and then adopted modern contraception. Women in their 40s, however, were more inclined to continue using traditional methods irrespective of their family size. They probably used abstinence either terminally or periodically in combination with rhythm or withdrawal.

Urban–rural residence. Urban women are usually more likely to use modern methods than rural women. Among the reasons for this typical pattern are easier access to modern methods in urban areas, the desire for larger families among rural couples, their lower educational level, and their more traditional outlook (UN, Department of International Economic and Social Affairs 1981:96).

The Sri Lanka Contraceptive Prevalence Survey revealed little difference between urban and rural women in prevalence of contraceptive use (57 and 54 percent, respectively) or in their use of traditional methods (26 and 24 percent) (Sri Lanka, Department of Census and Statistics 1983:77). These findings could be attributed, at least in part, to similar awareness among urban and rural women of the availability of family planning services; in both urban and rural areas, the overwhelming majority of women not using modern methods (98 and 97 percent, respectively) nevertheless knew where to obtain services (Sri Lanka, Department of Census and Statistics 1983:83). Even among current contraceptors, rural versus urban residence alone did not account for differences in use of traditional methods (Table 9.10). However, when the effects of age and the number of living children were also taken into account, the odds in favor of traditional method use among rural contraceptors were 22 percent higher than among urban users.

The larger family size of the rural contraceptors masked the effect of urban–rural residence on the choice of method type. Rural women in almost every age group had more living children than urban women (Sri Lanka, Department of Census and Statistics 1983:40), and women with larger families were less likely to use traditional methods. Even after the influence of family size was accounted for, however, rural contraceptors showed a greater propensity to use traditional methods. To the extent that a desire for larger families was reflected in a larger number of living children, it lowered the odds in favor of traditional method use by rural women. It is possible that the greater tendency of rural women to perceive access to modern contraception as being inconvenient, combined with their more traditional outlook, have made them more favorably disposed to traditional methods.

Education. Several studies have documented a positive relationship between women's educational attainment and their use of the rhythm method (Chapter 7, by De Vanzo et al.; Liskin 1981:60; Moors 1974:111). In Sri Lanka, too,

Table 9.10. Relative propensity to use traditional methods, by age, number of living children, urban-rural residence, education, and ethnicity: Sri Lanka Contraceptive Prevalence Survey, 1982

Background variable	Urban and rural		Urban		Rural	
	Relative propensity	Degrees of freedom	Relative propensity	Degrees of freedom	Relative propensity	Degrees of freedom
Age (AGE)						
(Reference category = <25)						
25-29	0.52†	35	ne	ne	ne	ne
30-34	0.61†	35	ne	ne	ne	ne
35-39	0.49†	35	ne	ne	ne	ne
40+	0.72†	35	ne	ne	ne	ne
25-29 (UR,LICH)	0.84	31	ne	ne	ne	ne
30-34 (UR,LICH)	1.18	31	ne	ne	ne	ne
35-39 (UR,LICH)	1.13	31	ne	ne	ne	ne
40+ (UR,LICH)	1.77†	31	ne	ne	ne	ne
Number of living children (LICH)						
(Reference category = <2)						
2	0.45†	36	ne	ne	ne	ne
3	0.20†	36	ne	ne	ne	ne
4+	0.20†	36	ne	ne	ne	ne
2 (AGE,UR)	0.42†	31	ne	ne	ne	ne
3 (AGE,UR)	0.18†	31	ne	ne	ne	ne
4+ (AGE,UR)	0.16†	31	ne	ne	ne	ne
Urban-rural status (UR)						
(Reference category = urban)						

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Rural	1.09	38	na	na	na	na
Rural (AGE,LICH)	1.22*	31	na	na	na	na
Education (ED)						
(Reference category = < secondary)						
Secondary+	ne	ne	1.45*	16	1.24†	16
Secondary+ (LICH,AGE)	ne	ne	1.21	12	1.04	12
Ethnicity (ETH)						
(Reference category = Sinhala)						
Sri Lankan Tamil	ne	ne	0.75	15	1.03	20
Indian Tamil	ne	ne	ne	ne	0.48†	20
Moor or Malay	ne	ne	0.34†	15	0.75	20
Sri Lankan Tamil (LICH,AGE)	ne	ne	0.93	12	0.98	17
Indian Tamil (LICH,AGE)	ne	ne	ne	ne	0.51†	17
Moor or Malay (LICH,AGE)	ne	ne	0.32†	12	0.84	17

Notes: Relative propensity is defined as the odds of currently using traditional methods that women in each category have in relation to the reference category. Relative propensity = e^{B_i} where B_i is the estimate of the respective category obtained by logit regression. Labels for variables within parentheses indicate that these variables have been controlled. An asterisk indicates significance at the 10 percent level; a dagger indicates significance at the 5 percent level.

ne—not estimated.

na—not applicable.

traditional method share of contraceptive use was positively associated with education (Table 9.9). However, the proportions of contraceptors using traditional methods were lower in urban than in rural areas at each educational level. In the urban sector 40 percent of women with no formal education or only primary schooling, compared with 49 percent of those with at least secondary education, were using traditional methods. In the rural sector the percentages were 47 percent among those with less education and 52 percent among those with more. Without any controls, both urban and rural contraceptors with a secondary or higher education showed a greater propensity than less educated women to use traditional methods, though this propensity had more statistical significance in the rural than in the urban sector (Table 9.10).

The influence of women's education on their use of traditional methods diminished when the effects of the number of living children were taken into account (the odds that urban contraceptors with secondary or higher education would use traditional methods were 21 percent higher than for a similar group with lower education), but the difference was not statistically significant. In the case of rural contraceptors, age and number of living children accounted almost entirely for the initial education differential. For the rural women with secondary or higher education, the odds were a mere 4 percent higher than for the lower education category in favoring traditional methods of contraception.

The above analysis suggests that education influences contraceptive choice largely through family size. More-educated women in most age groups had fewer children (Sri Lanka, Department of Census and Statistics, 1983:40), and women with smaller families tended to use traditional methods more than did women with larger families. Thus, it first appeared that the better-educated contraceptors favored traditional methods more than the less educated, but when the effect of family size was taken into account education no longer had an important effect. In both urban and rural sectors, nearly the same proportions of family planners who had at least a secondary education used traditional methods as did those with no more than a primary education among women who had the same number of living children.

Ethnicity. Cultural values are thought to have an important influence on fertility behavior, either directly or through other variables such as living conditions. They may also affect receptivity to new ideas and retard or facilitate the spread of information. In Sri Lanka, cultural differences tend to be along ethnic and religious lines. Among respondents in the Contraceptive Prevalence Survey, 74 percent were Sinhalese, 12 percent were Sri Lankan Tamils, 7 percent were Indian Tamils, and 7 percent were Moors or Malays. A negligible proportion (0.4 percent) were of other ethnic back-

grounds. The Sinhalese are the descendents of the earliest settlers in the island, who migrated from North India in the fifth century B.C. Sri Lankan Tamils owe their ethnic origin to settlers from South India in the second century B.C. Indian Tamils immigrated to the island within the last hundred years. The Moors and Malays are descendants of ancient traders from the Middle and Far East. Ninety-four percent of Sinhalese are Buddhists, 78 percent and 90 percent of Sri Lankan Tamils and Indian Tamils, respectively, are Hindus, and 99 percent of Moors and Malays are Muslims (Sri Lanka, Department of Census and Statistics 1983:28-29). Since ethnicity and religion are closely correlated, one or the other would suffice for most analyses.

In 1982 Indian Tamils and especially Moors had high levels of completed fertility, and all minority groups had lower levels of contraceptive experience than the Sinhalese (Sri Lanka, Department of Census and Statistics 1983:31-52, 64-67).

Among contraceptors in the Contraceptive Prevalence Survey, traditional methods were most popular among the Sinhalese and Indian Tamils (53 and 47 percent, respectively) and least popular among the Indian Tamils and the Moors and Malays (29 and 35 percent, respectively).

For the purpose of the following analysis, age groups were reclassified as less than 30 and 30 or older, and urban Indian Tamils were included in the urban Sri Lankan Tamil category because of their very small number (six).

Relative to the Sinhalese, the odds in favor of traditional method use among ethnic groups varied in somewhat unexpected ways, depending on urban-rural residence (Table 9.10). Without any controls on other background variables, Moors and Malays showed a significantly lower propensity than Sinhalese women to use traditional methods only if they were urban. Even after the effects of family size and age were taken into account, ethnic variables in combination with rural-urban residence retained the same order of difference. Rural Moors and Malays were not significantly different from rural Sinhalese in their use of traditional methods. Only rural Indian Tamils showed a significantly lower propensity to use traditional methods with or without controls for age and the number of living children. Hinduism, practiced by Indian Tamils, and Islam, practiced by Moors and Malays, are probably more resistant to behavioral change among their adherents than is Buddhism, practiced by a majority of Sinhalese. The results, therefore, suggest that the Moors and Malays living in urban areas and the Indian Tamils living in rural areas were exposed to circumstances that overrode their traditional religious views. Special promotional campaigns and mobile service outlets have been directed at both groups.

SUMMARY AND CONCLUSION

The most striking feature of contraceptive use in Sri Lanka is the very high preference for traditional methods, especially rhythm and abstinence, despite very high levels of knowledge about, and accessibility to, modern contraceptive methods. There is evidence that users rely on a combination of traditional methods alone or with condoms but do not report multiple use.

According to data from the 1982 Contraceptive Prevalence Survey in Sri Lanka, half of all married women of reproductive age who had ever used contraception had chosen a traditional method as their first method. A majority favored rhythm, with the exception of estate women, who preferred to use abstinence instead.

A fairly high proportion of the initial acceptors of traditional methods, however, discontinued their use in favor of other methods or nonuse. Abstinence and withdrawal were the subsequent choice of most traditional contraceptors.

Of five background characteristics—women's current age, number of living children, urban versus rural residence, education, and ethnicity—the number of living children was found to have the greatest influence on traditional method use, and that influence was negative. Contraceptors with no children or only one child were more likely to be using traditional methods than were contraceptors with two or more children, and mothers of only two living children were more likely to be using traditional methods than were mothers of three or more living children. The influence of family size retained its significance irrespective of women's age or urban-rural residence.

Age influenced traditional method use largely through family size, except that women over age 39 were more inclined than others to use traditional methods regardless of their family size or urban-rural residence, because of a greater adherence to tradition.

The greater tendency of rural contraceptors to use traditional methods was masked by age and family-size differences. If contraceptors in the urban and rural areas had had the same age structure and number of living children, rural women would have been more likely to use traditional methods.

Contrary to expectation, secondary or higher education did not predispose women to accept modern contraception more readily (or traditional methods less readily) in either rural or urban areas if there were no differences in age or family size.

Cultural differences, measured by ethnicity and indirectly by religion, had some influence on traditional method use, depending upon urban-rural residence. A surprising finding was that Moors and Malays living in urban areas and Indian Tamils living in rural areas were much less likely

to use traditional contraception than were Sinhalese living in the same areas. Being mostly Moslems or Hindus, these two groups were expected to have a traditional outlook on life. That urban Moors and Muslims were different in their contraceptive behavior from their rural counterparts suggests that conditions peculiar to an urban setting outweighed cultural conditioning.

The study provided some clues to the continued popularity of traditional methods in Sri Lanka, despite widespread knowledge and availability of modern contraceptives. The findings suggest that contraceptive experience promoted traditional method use. On one hand, promotional campaigns and the ready availability of modern contraceptives should have encouraged use of those methods. On the other, the monetary cost and perceived inconvenience of obtaining modern methods seemed to work in the opposite direction. It was not possible to assess the net effect of contraceptive access with the available data. A fairly high level of contraceptive competence was indicated by the general attitude that family planning was possible without modern contraceptives. A desire to space births, indicated by significantly more traditional method use among low-parity women, suggests that contraceptive goals have played a major role in method choice in Sri Lanka.

If fertility control had remained largely nonsurgical, it is possible that the higher levels of traditional method use at the youngest and oldest age groups would have persisted; many women who had used modern contraception to space births would have relied, like their mothers, upon sexual abstinence or very low levels of sexual activity in later years to prevent further pregnancies. But the success with which sterilization is being promoted in Sri Lanka is likely to obscure, and perhaps largely disrupt, this pattern.

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Appendix Table 9.1. Deviances from fitting hierarchical logit-linear models to proportions using traditional methods: Sri Lanka

Model	<i>df</i>	Deviance	Remarks
1. NULL	39	212.5	
2. AGE	35	187.7	
3. LICH	36	54.2	
4. UR	38	211.9	
5. AGE + LICH	32	37.7	Best model
6. AGE + UR	34	187.3	
7. LICH + UR	35	52.2	
8. AGE + LICH + UR	31	34.9	No significant improvement on (5)

10 Determinants and Consequences of Contraceptive Method Choice in India

by J. R. Rele, P. N. Kapoor, and M. E. Khan

The family planning program of India, begun in 1952 as part of the first Five-Year Plan of independent India, has a long and varied history. As the program developed, its focus and content evolved, and so did the choice of contraceptive methods that it promoted. The program has benefited from large-scale experimentation with program direction, strategies, and methods.

The initial strategy was to provide contraceptive information and services to the public primarily through hospitals, health centers, and a few family planning clinics that were opened in urban and rural areas of the country. The first method the government promoted was rhythm. Although special devices, such as colored bead chains, were offered to clients to help them ascertain the "safe period," the rhythm method was doomed to failure among illiterate rural women because of the attention it needed and the variability of the safe period among women. The government then turned to other conventional methods, such as the condom, diaphragm, vaginal jellies, and foam tablets, especially the last three methods. But clients, rural women in particular, found those methods to be inconvenient. Diaphragms came in several sizes and had to be fitted by an expert. Women found the methods difficult to use for lack of water, sanitation, lighting, and privacy. These problems led to the introduction of male and female sterilization, the intrauterine device (IUD), and, later, oral contraceptives.

AVAILABILITY AND CHOICE OF SPECIFIC METHODS

In the program's early stages, until 1962, its approach was essentially clinical. The government assumed that people would visit the program's few clinics to seek advice and services. When this failed to happen, it adopted an extension approach. The essence of this modification was to advocate small families and to bring family planning services as close as possible to couples' doorsteps through an improved network of primary health centers and subcenters. A full-fledged Department of Family Planning was created in 1966 in the Ministry of Health and Family Planning. To encourage contraceptive practice, the program adopted a "cafeteria approach" purporting to offer clients their choice of methods. In practice, however, choice was limited by inadequate facilities and services and by the methods the government chose to promote, one or two at a time. The program's choices were governed by what officials considered to be best for the public, and also by the existing contraceptive technology. As a result of the program's evo-

lution, therefore, contraceptive method choice has undergone continual change in India (Table 10.1). In this chapter we examine how the various methods have fared over time and the factors that have influenced method choice.

Intrauterine Devices

In 1965 the government began to promote the intrauterine device, which was effective and inexpensive. Initial response was good, and the program performed 910,000 IUD insertions in fiscal year 1966-67 (1 April to 31 March). Acceptance of this method declined in succeeding years as the drawbacks

Table 10.1. Percentage distribution of contraceptive acceptors, by method and year: India, 1956-86

Year	Sterilization		IUD	Conventional methods	Pill	All methods	Number (thousands)
	Male	Female					
1956-62	60	40				100	415
1963	25	12		64		100	468
1964	28	10		62		100	709
1965-66	28	5	39	28		100	2,066
1966-67	35	4	40	21		100	2,262
1967-68	55	6	22	16		100	2,984
1968-69	44	9	15	31		100	3,105
1969-70	31	11	14	45		100	3,390
1970-71	23	12	13	52		100	3,769
1971-72	32	11	10	47		100	5,029
1972-73	44	8	6	41		100	5,875
1973-74	9	12	9	70		100	4,324
1974-75	14	17	10	58		100	4,308
1975-76	21	18	9	51	*	100	6,804
1976-77	49	16	5	29	*	100	12,534
1977-78	4	17	7	70	2	100	4,528
1978-79	7	20	10	62	2	100	5,505
1979-80	9	24	12	54	2	100	5,482
1980-81	7	25	10	57	1	100	6,490
1981-82	7	27	9	55	2	100	8,102
1982-83	5	31	10	52	2	100	11,028
1983-84	4	26	14	51	5	100	15,056
1984-85	3	22	16	52	6	100	16,442
1985-86	3	22	17	50	7	100	18,920

Source: India, Ministry of Health and Family Welfare (1988:159-167).

Note: Percentages may not sum exactly to 100 because of rounding.

*Less than 1 percent.

and side effects of the IUD began to appear. Program officials observed that IUDs were not well suited to women who were malnourished or anemic, and the expulsion rate was high; moreover, bleeding and pain were fairly common side effects. It became clear that successful use of IUDs in the program required proper selection of women and acceptor follow-up. The acceptance rate dropped to 355,000 insertions in 1972-73 but stabilized around 500,000 annually in subsequent years. Since 1981-82 there has been renewed program interest in the IUD, and the proportion of IUD acceptors to total acceptors has been rising.

Sterilization

Male and female sterilization (vasectomy and tubectomy) were made available in hospitals and primary health centers at an early stage of the national program but did not gain many acceptors until the introduction of incentive payments in 1966. After reaching a peak in 1967-68, the acceptance rate for vasectomy dropped sharply owing to some cases of postoperative pain and illness, as well as for social reasons, whereas tubectomy continued to gain in acceptance until 1970-71. Vasectomy camps, held in various parts of the country and promoted by the government, caused vasectomy figures to rise once again during the next two years, but the camps soon came into disrepute because of insufficient follow-up of acceptors and complaints of medical complications. The program continued to waver until the period of the national emergency beginning in June 1975. The atmosphere of the emergency gave a special boost to the sterilization program, especially vasectomies. In a single year, 1976-77, the number of sterilizations reached an all-time peak of 8.3 million, including 6.2 million vasectomies and 2.1 million tubectomies. The sterilization program soon became unpopular, and immediately after the emergency the number of sterilizations slumped to fewer than one million in 1977-78, of which 80 percent were tubectomies. It was not until 1980-81 that the sterilization program began to pick up momentum again, but not without a change in focus from vasectomy to tubectomy. The transition was assisted by the introduction of a simplified method of female sterilization using laparoscopy. Tubectomies continue to constitute about 85 percent of total sterilizations in India.

Conventional Contraceptives

Conventional contraceptives, which include condoms, diaphragms, vaginal jellies and creams, and foam tablets, were introduced into the program in 1962. Condom users constitute the great majority of conventional method users, 99 percent in recent years. The number of conventional method users has been rising, and their proportion among total acceptors has always been substantial. Fluctuations in their share have been due mainly to fluctuations in the acceptance of sterilization and the IUD, and conventional

method use has played a sustained role in India's family planning program. Its role may be even greater in the future as more couples elect to space births at younger ages.

Oral Contraceptives

Orals were introduced into the national program on a small scale in 1976. Their widespread use has been constrained by their cost and the high level of motivation and attention required to use this method. They are considered more suitable for women who are urban, better educated, and better-off economically than other women. Use of orals has been rising since 1983-84 and may continue to rise as the preference for spacing methods increases.

FACTORS AFFECTING METHOD CHOICE

Two major factors affecting contraceptive acceptance and method choice are the available contraceptive technology and couples' motivation to regulate births. They can be further classified into five categories—program emphasis, contraceptive attributes, motivation for contraception, social factors, and couples' background characteristics. These factors do not operate in isolation but tend to interact with or reinforce one another.

Program Emphasis

Even though the Indian family planning program in principle follows a cafeteria approach to method provision, in reality it has given priority to particular methods from time to time. Promotion of the IUD during 1965-67 led to 1.7 million IUD insertions during that period. Similarly, when the program gave priority to the condom during 1968-69, distribution of condoms rose from 24.5 million to 59.2 million pieces within the year, and rose further in subsequent years. In 1966 the government began to promote sterilization by offering incentive payments to acceptors, and sterilization soon became the main method promoted by the service outlets. Other methods were also offered but were given low priority by the extension workers, who were evaluated largely on the basis of whether they achieved their sterilization targets (Khan 1985). Until 1972-73 the program gave vasectomies far more importance than tubectomies, organizing mass vasectomy camps to encourage acceptors. As a result, vasectomies accounted for a large majority of total sterilizations. This trend was reversed, substantially favoring tubectomies, with the arrival of the laparoscopic technique. Recently the government changed its policy and is now promoting temporary methods to enlist younger women for spacing their childbearing. This new policy has resulted in a substantial rise in the number of IUD and condom users.

The government's policies and policy changes have also been reflected in the public's knowledge of various methods and the availability of those

methods. For example, the Second All India Survey, conducted in 1980–81 by the Operations Research Group in Baroda, found that, although 95 percent of eligible couples were aware of vasectomy and tubectomy, the proportions aware of other methods were much lower: 54 percent for the condom, 43 percent for the IUD, and 36 percent for the pill. Knowledge about the proper use of these methods was even less widespread. Rural couples' access to temporary contraceptive methods was problematic during the years when the national program was promoting sterilization through its vasectomy camps. A shortage of female physicians and paramedical staff trained to insert IUDs posed serious problems for IUD acceptance. Though condoms were promoted through social marketing, accessibility of this method in rural areas was limited because only about 8 percent of the rural outlets stocked any brand of condom. However, with the government's new emphasis on temporary methods and its promotion of them through a corporation called the Contraceptive Marketing Organisation, it is expected that the pattern of contraceptive acceptance in India will change.

Attributes of Contraceptives

A crucial element in contraceptive choice is the actual and perceived attributes of each method—its effectiveness, convenience, and side effects. For example, many couples who want no more children nevertheless reject sterilization primarily because they are afraid of the operation and associated side effects. In contrast, a large number of couples choose sterilization because it is a permanent and effective method, freeing them from the worries of unwanted pregnancies. Similarly, some couples prefer the condom to other temporary methods because it is easy to obtain, economical, temporary, and free from side effects, whereas others reject it because it reduces sexual pleasure and is less effective than some other methods. Attributes of contraceptives and perceptions about them may change over time. For instance, a new, simplified surgical procedure for vasectomy facilitated the acceptance of this method during the late 1960s. Similarly, the recent rise in the acceptance of tubectomy is due in part to the simplified laparoscopic operation. Improvements in contraceptive technology may change the actual attributes of contraceptives, and information about methods' attributes can alter public perceptions and lead to changes in acceptance rates.

Motivation for Contraception

Couples' motivations for using contraception play a significant role in their choice of methods. If couples want to space births, they will adopt a temporary method. If they want to stop childbearing, they may adopt either sterilization or a temporary method, depending on their knowledge and perception of the available methods. Their reasons for using contraception

may be influenced by a program's emphasis. For instance, the Indian program's earlier emphasis on sterilization created the general impression that the purpose of family planning was to stop having children. This view persists today in the countryside, where few couples consider spacing their births, instead choosing sterilization when they have achieved their desired number of sons and daughters. With the program's current emphasis on health and spacing of births, a shift toward temporary methods at younger ages is foreseeable.

Social Factors

Social factors influence not only the acceptance of family planning, but also the choice of contraceptives. Many studies have indicated that the decision to adopt a particular method, such as the IUD or pill, is greatly influenced by the contraceptive experience of a woman's relatives and close friends. Some women, however, are hesitant to accept particular methods because of side effects reported by friends or relatives, or for religious reasons. Many Muslim women in India prefer temporary to permanent methods in the belief that permanent methods are prohibited by Islam.

Social factors also play a crucial role in the continuation or discontinuation of family planning methods. In the Indian culture, a menstruating woman is considered unclean and may not be allowed to cook, serve food, or participate in religious activities. A recent study sponsored by the World Health Organization and the Indian Council of Medical Research (1984) found that physiological problems such as bleeding or spotting due to the use of the IUD or pill were less important as a cause for discontinuation than the social stigma they caused for the acceptors.

Couples' Background Characteristics

Couples' background characteristics are a major factor in contraceptive motivation. Among the background characteristics that affect method choice are wife's age, number of living children, educational status of husband and wife, religion, and rural-urban residence.

INFLUENCE OF SOCIODEMOGRAPHIC FACTORS

To determine the influence of background characteristics on method choice in India, we analyzed two data sets. The first, compiled by the government of India (Ministry of Health and Family Welfare 1984, 1985, 1988), includes contraceptive acceptor statistics mainly over the period 1981-86, classified by method and fiscal year. The second, from the Second All India Survey conducted in 1980-81 by the Operations Research Group (henceforth called the ORG Survey), includes contraceptive users among a nationally representative sample of 34,831 eligible couples, classified by method (M. E. Khan and Prasad 1983).

Wife's Age

The age distributions of acceptors of vasectomy, tubectomy, and IUDs from 1980-81 to 1984-85, presented in Table 10.2, show that in general IUD acceptors were younger than tubectomy acceptors, who in turn were younger than wives of vasectomy acceptors. In 1984-85 the proportion of IUD acceptors below age 30 (71 percent) was much higher than the corresponding percentages of tubectomy and vasectomy acceptors. Moreover, the proportion of younger women among IUD acceptors rose between 1980-81 and 1984-85, whereas there is no such indication for the other two methods. Although the number of acceptors of each method rose over the period, the increase was most dramatic for the IUD. As a result, although tubectomy remained the most popular method among all couples, by 1983-84 the IUD had become the preferred method among younger couples.

The ORG Survey, which collected user data rather than acceptor data, also recorded greater preference for spacing methods among younger women. In 1980-81 wives less than 30 years of age, who constituted 53 percent of all married women in the reproductive age groups, accounted for 47 percent of IUD users, 63 percent of pill users, and 56 percent of condom users, but only 21 percent of sterilization users (Table 10.3). Among the spacing methods, the condom was preferred to the pill and the IUD in all age groups (Table 10.4).

Number of Living Children

Method choice varied by acceptors' number of living children. According to data from the Family Welfare Programme, IUD acceptors tended to have two or fewer living children, whereas acceptors of vasectomy and tubectomy were more likely to have three or more living children (Table 10.5). In 1984-85, 73 percent of vasectomy acceptors and 80 percent of tubectomy acceptors had three or more living children, whereas not more than 39 percent of IUD acceptors had three or more living children. Over the period examined, not only did a steep rise occur in the number of IUD acceptors, but also the percentage among them having no more than two living children rose from 53 to 61 percent.

Data from the ORG Survey of 1980-81 corroborate the Family Welfare Programme's findings. Couples with one or no living children, who constituted 36 percent of all couples, accounted for less than 3 percent of sterilization acceptors and for 13 percent of IUD users, 26 percent of condom users, and 28 percent of pill users (Table 10.3), indicating higher proportions of such couples among users of spacing methods, particularly the condom and the pill. Couples with three or more children accounted for 84 percent of total sterilization users, 52 percent of IUD users, 45 percent of pill users, and 45 percent of condom users, indicating the predominance of these couples among users of sterilization. The prevalence rates for

Table 10.2. Percentage distribution of vasectomy, tubectomy, and IUD acceptors, by wife's age and year: India, 1980-81 to 1984-85

Method and year	Percentage of acceptors, by wife's age										Number (thousands)	Mean age of wife
	<15	15-19	20-24	25-29	30-34	35-39	40-44	45+	<30	All ages		
Vasectomy												
1980-81	0	0	10	29	33	20	6	0	40	100	409	31.6
1981-82	0	0	10	27	32	23	8	0	37	100	516	32.0
1982-83	0	0	10	26	34	23	7	0	36	100	525	32.1
1983-84	0	1	12	27	29	25	7	0	40	100	625	31.8
1984-85	0	1	11	27	32	22	7	0	38	100	541	31.8
Tubectomy												
1980-81	0	0	13	36	32	15	3	0	49	100	1,524	30.5
1981-82	0	0	13	36	31	16	3	0	49	100	1,911	30.5
1982-83	0	0	12	34	33	17	4	0	46	100	2,863	30.8
1983-84	0	1	13	34	32	17	4	0	47	100	3,554	30.7
1984-85	0	1	13	35	33	15	3	0	49	100	3,442	30.3
IUD												
1980-81	0	4	28	34	22	9	2	0	67	100	563	28.0
1981-82	0	4	28	35	21	9	2	0	68	100	628	27.9
1982-83	0	5	30	34	20	8	2	0	69	100	966	27.7
1983-84	0	6	34	33	19	7	1	0	73	100	2,006	27.1
1984-85	0	5	31	34	20	8	2	0	71	100	2,470	27.4

Source: India, Ministry of Health and Family Welfare (1988:236-237).

Note: Percentage distributions are based on numbers of acceptors for whom wife's age was known. Percentages may not sum exactly to 100 because of rounding. Data are not available from Bihar for 1982-83 nor from Nagaland and Tripura for 1980-81.

Table 10.3. Percentage distribution of contraceptive users, by method, wife's age, number of living children, wife's education, and religion: India, 1980-81

Characteristic	Sterilization	IUD	Pill	Condom
Wife's age				
< 20	0	1	5	4
20-24	4	20	28	23
25-29	17	25	30	29
30-34	23	25	20	21
35-39	28	14	11	14
40+	29	14	5	9
All ages	100	100	100	100
Number of living children				
0	0	1	6	5
1	2	12	22	21
2	13	35	28	29
3	27	18	17	20
4	25	15	14	14
5+	32	19	14	11
All numbers	100	100	100	100
Mean number	4	3	2	2
Wife's education				
Illiterate	60	25	27	37
Up to primary school	20	20	17	15
Up to matriculation (high school)	18	36	40	33
Up to technical high school	1	8	7	6
University graduate +	1	10	9	9
All educational levels	100	100	100	100
Religion				
Hindu	88	84	81	78
Muslim	5	7	15	11
Other	7	9	4	11
All religions	100	100	100	100

Source: M. E. Khan and Prasad (1983:133-134).

Note: Percentages may not sum exactly to 100 because of rounding.

Table 10.4. Percentage of couples currently using specific contraceptive methods, by wife's age, number of living children, wife's education, and religion: India, 1980-81

Characteristic	Sterilization	IUD	Pill	Condom
Wife's age				
< 20	0.0	0.0	0.7	2.4
20-24	4.5	0.5	1.4	5.3
25-29	18.4	0.6	1.3	5.9
30-34	29.7	0.7	1.2	5.3
35-39	37.6	0.4	0.7	3.6
40+	33.6	0.3	0.3	2.0
Number of living children				
0	0.4	0.0	0.4	1.5
1	3.3	0.3	1.3	5.7
2	16.4	0.9	1.5	6.8
3	33.7	0.5	0.9	4.8
4	40.1	0.5	0.9	4.0
5+	38.4	0.5	0.7	2.7
Wife's education				
Illiterate	19.0	0.2	0.4	2.3
Up to primary school	32.3	0.7	1.2	4.6
Up to matriculation (high school)	29.9	1.2	2.8	10.4
Up to technical high school	17.5	3.1	5.3	22.0
University graduate +	13.7	3.2	6.0	25.3
Religion				
Hindu	23.3	0.5	0.9	4.0
Muslim	11.2	0.3	1.4	4.4
Other	29.1	0.8	0.7	8.4
All couples	22.4	0.5	1.0	4.7

Source: M. E. Khan and Prasad (1983:152-153).

1980-81 (Table 10.4) clearly indicated greater use of condoms than of other methods among couples with one or no living children, and sterilization among those with two or more children.

Wife's Education

The Family Welfare Programme's data show the educational level of wives to have been generally higher among IUD acceptors than among acceptors of vasectomy or tubectomy during the period under review (Table 10.6). A similar relationship was found between husbands' education and the method chosen (data not shown). Among acceptors in general the preferred method was tubectomy, but for women who were university graduates or above the preferred method was the IUD.

Table 10.5. Percentage distribution of vasectomy, tubectomy, and IUD acceptors, by number of living children and year: India, 1980-81 to 1984-85

Method and year	Percentage of acceptors, by number of living children								Number (thousands)	Mean number of living children
	0	1	2	3	4	5+	≤ 2	Total		
Vasectomy										
1980-81	0	1	24	35	24	16	25	100	413	3.5
1981-82	0	1	25	37	23	15	25	100	517	3.4
1982-83	0	1	25	39	22	13	26	100	524	3.4
1983-84	0	1	25	36	25	13	26	100	610	3.4
1984-85	0	1	26	38	23	12	27	100	540	3.5
Tubectomy										
1980-81	0	1	16	35	29	20	16	100	1,509	3.7
1981-82	0	1	16	36	28	20	17	100	1,910	3.7
1982-83	0	0	16	36	28	20	17	100	2,834	3.7
1983-84	0	1	18	37	27	17	18	100	3,372	3.6
1984-85	0	1	19	37	28	15	20	100	3,439	3.5
IUD										
1980-81	1	19	32	25	15	8	53	100	557	2.6
1981-82	1	20	34	25	13	7	55	100	611	2.6
1982-83	1	20	35	25	12	6	56	100	979	2.5
1983-84	1	27	36	22	10	4	63	100	1,964	2.3
1984-85	2	24	35	23	11	5	61	100	2,468	2.4

Source: India, Ministry of Health and Family Welfare (1988:245-246).

Note: Percentage distributions are based on numbers of acceptors for whom the number of living children was known. Percentages may not sum exactly to 100 because of rounding. Data are not available from Bihar for 1982-83 or 1983-84, nor from Nagaland and Tripura for 1980-81.

Table 10.6. Percentage distribution of vasectomy, tubectomy, and IUD acceptors, by wife's educational status and year:
India, 1980-81 to 1985-86

Method and year	Percentage of acceptors, by wife's educational status						All statuses	Number (thousands)
	Illiterate	Below primary school	Completed primary school	Completed middle school	Completed high school	University graduate +		
Vasectomy								
1980-81	50	17	16	10	6	2	100	369
1981-82	46	15	18	13	6	2	100	445
1982-83	45	17	18	13	5	2	100	489
1983-84	48	19	16	10	5	2	100	598
1985-86	46	20	16	11	6	2	100	559
Tubectomy								
1980-81	49	14	17	12	6	2	100	1,410
1981-82	47	16	17	12	6	2	100	1,572
1982-83	51	17	15	10	5	2	100	2,775
1983-84	50	17	16	10	6	2	100	3,326
1985-86	50	18	15	10	5	2	100	3,713
IUD								
1980-81	35	15	16	14	14	5	100	520
1981-82	32	15	17	16	14	6	100	518
1982-83	33	17	18	15	12	6	100	942
1983-84	37	17	18	15	9	4	100	1,941
1985-86	40	19	16	13	8	4	100	2,977
All currently married women, ages 15-44, 1981 census								
	74	15		5	5	1	100	2,977

Sources: India, Ministry of Health and Family Welfare, (1985b:231-236; 1988:257-259); Kapoor (1985).

Note: Percentage distributions are based on numbers of acceptors for whom educational status was known. Percentages may not sum exactly to 100 because of rounding. Data for 1984-85 were not readily available.

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The ORG Survey reported that among women with less education the preferred method was sterilization, followed by the condom, pill, and IUD, but among women with more than high school education the preferred method was the condom (Table 10.4). The proportion of couples practicing sterilization ranged from 19 percent for illiterate wives to 30 percent for wives who had completed high school, but the prevalence of sterilization was lower among couples with higher education. In contrast, for IUDs, pills, and especially condoms, the contraceptive prevalence rate increased with the educational status of wives. Thus, education of the wife was strongly related to method choice, higher education producing a shift from permanent methods to spacing methods.

Religion

The ORG Survey found little difference in prevalence rates between Muslims and Hindus for the IUD, pill, and condom. For sterilization, however, prevalence rates among Hindus were double those of Muslims (Table 10.4). The prevalence rates among other religious groups—mostly Christians and Sikhs—were highest for all methods except pills.

Rural–Urban Residence

Nearly 77 percent of India's population lived in rural areas in 1981, according to the 1981 census. According to national family planning program statistics (India, Ministry of Health and Family Welfare 1988:225–231), in 1982–83, 70 percent of all sterilization acceptors (67 percent of vasectomy acceptors and 71 percent of tubectomy acceptors) and 65 percent of IUD acceptors lived in rural areas. These figures indicate that acceptance of all three methods, particularly the IUD, was lower in rural than in urban areas. The next year, however, the proportion of rural IUD acceptors rose sharply, to 75 percent, as a result of a steep rise in IUD acceptances throughout the country, especially in rural areas. For the total population, acceptance rose by 95 percent, but the increase was 125 percent for the rural and only 40 percent for the urban population. In 1985–86 the proportion of rural acceptors was 73 percent for vasectomy, 71 percent for tubectomy, and 76 percent for the IUD, indicating considerable reduction in the rural–urban disparity in the acceptance of these methods.

The ORG Survey also found use of sterilization, the IUD, pills, and the condom to be higher in urban than in rural areas in 1980–81 (Table 10.7). The difference in prevalence rates was greatest for the IUD and least for sterilization. The preference for sterilization over other methods was especially noticeable in rural areas.

Table 10.7. Percentage of couples using specific contraceptive methods, by urban-rural residence: India, 1980-81

Method	Percentage using method			Ratio of urban to rural
	Rural	Urban	Total	
Sterilization	21.2	26.7	22.4	1.3
IUD	0.3	1.3	0.5	4.3
Pill	0.7	2.1	0.8	3.0
Condom	2.7	10.3	4.4	3.8
Any modern method	24.9	40.4	28.1	1.6

Source: M. E. Khan and Prasad (1983:123).

REASONS FOR CHOOSING AND DISCONTINUING SPECIFIC METHODS

Information on reasons for preferring and for discontinuing specific methods is available at the national level from the ORG Survey and at the state level from studies (mostly unpublished) by state demographic and evaluation cells and population research centers of various states.

Reasons for Choosing Specific Methods

According to the ORG Survey, the most commonly perceived advantages of the condom over other methods reported by those who had ever used it were (in descending order of frequency of mention) that it was a temporary method, was economical, was safe and sure, was easily available, and had no after effects (Table 10.8). Nonusers who were aware of the condom mentioned as its advantages that it was temporary, easy to use, and economical.

Studies by the demographic and evaluation cells of the states of Assam, Gujarat, Kerala, Madhya Pradesh, and Uttar Pradesh involving 3,204 acceptors of laparoscopic tubectomy and 3,002 acceptors of conventional tubectomy found that women who chose the laparoscopic operation preferred it to conventional tubectomy because it did not require hospitalization, was done by experts, and had fewer side effects. Acceptors of conventional tubectomy stated that its advantages over laparoscopic tubectomy were that it was more popular, entailed less travel, and had fewer side effects.

A baseline survey conducted in Orissa in 1982 by the International Institute for Population Sciences, which covered 5,000 households, found that the main reasons for choosing tubectomy mentioned by women who had accepted that method were the wife's interest, the husband's being physically too weak to have a vasectomy, the husband's preference, vasectomy's interference with the husband's ability to work, and tubectomy's convenience at the time of a delivery.

Table 10.8. Percentage of acceptors, by reason for choosing specific methods: India, recent years

Reason	Percentage of acceptors, by method and source of data										
	Vasectomy		Tubectomy					Laparoscopic tubectomy		IUD	Condom
	a	b	a	b	c	d	e	a	c	b	f
Economical											22
Easy to use/perform	87	95	32	62			4				37
Easy availability/accessibility					31						16
No hospitalization								57	70		
Performed by experts									21		
Safe, few side effects					25				13		28
Temporary method										92	30
Husband is breadwinner			62	38			14	85			
Husband's preference							17				
Husband's ill health							22				
Wife's preference							34				
Wife's ill health	13										
Fear of operation										8	
Popularity of method					77						

Sources: Mostly unpublished, reported by Kapoor (1985).

^aStudy in the Srikakulam district of Andhra Pradesh, conducted by the Population Research Centre, Waltair, 1982-83.

^bStudy in the Warangal district of Andhra Pradesh, conducted by the Population Research Centre, Waltair, 1981-82.

^cStudies by demographic and evaluation cells in the states of Assam, Gujarat, Kerala, Madhya Pradesh, and Uttar Pradesh with a total sample of more than 3,000 acceptors.

^dInternational Institute for Population Sciences (1985).

^eStudy in the Puri district of Orissa conducted by the Population Research Centre, Bhubaneswar, 1979-80.

^fM. E. Khan and Prasad (1983:173).

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A study done in the district of Srikakulam, Andhra Pradesh, in 1982–83 by the Population Research Centre (PRC) of Waltair, gave as the chief reasons for tubectomy acceptance that the husband was the family's main breadwinner and that the operation could be performed easily at the time of a delivery. Laparoscopy was preferred to tubectomy because it was easier and no hospitalization was required. A similar evaluation in 1981–82 in the district of Warangal, Andhra Pradesh, also by PRC, Waltair, found the main reasons for preferring tubectomy were the ease of the operation at the time of a delivery and the husband's role as breadwinner. A study in the Puri district of Orissa in 1979–80, conducted by PRC, Bhubaneswar, found wives' concerns that vasectomy would interfere with their husbands' ability to work or to support their families as the main reasons for preferring tubectomy.

According to the Srikakulam study, the main reasons acceptors chose vasectomy were that it was a simple operation requiring no hospitalization and concern over wives' ill health. Nearly all respondents in the Warangal study mentioned the simplicity of the procedure as the main reason for choosing vasectomy.

The main reason for choosing the IUD, mentioned by a large majority of respondents in both Srikakulam and Warangal, was the desire to space births. A second reason, mentioned by smaller percentages in both studies, was the fear of having a surgical procedure.

Thus, the main reasons for choosing specific methods that emerged from the various studies summarized in Table 10.8 were economic considerations, convenience of use, the permanence of the method, and health concerns, especially for the husband as the breadwinner. Vasectomy was preferred because it was a simple operation; tubectomy, because it was an easy procedure at the time of delivery, and to spare the husband, the main breadwinner, from the health hazards of vasectomy, which might also require his absence from work; laparoscopic tubectomy, because it needed no hospitalization and was performed by experts; the IUD, because it could be used to space births and by women afraid of an operation; and the condom, because it was temporary, economical, easy to use, safe, and easily available.

Reasons for Discontinuing Specific Methods

The main reasons for discontinuing IUD use, according to a study by demographic and evaluation cells of 14 states during 1976–78 and involving 7,459 women who had accepted IUDs in 1970–71, were bleeding, pain, and backache. Also mentioned by smaller proportions of IUD discontinuers were the decision to switch to another method and the desire for a child (Table 10.9). Another set of studies by the demographic and evaluation cells in seven states, involving 5,097 Copper T acceptors and 2,121 Lippes loop acceptors during the reference years varying between 1976–77 (in Gujarat) and

Table 10.9. Percentage of discontinuers, by reason for discontinuing specific methods: India, recent years

Reason	Percentage of discontinuers, by method and source of data					
	IUD			Pill c	Condom d, e	
	a	Lippes loop a	Copper T b			
Unpleasant side effects	44	17	9	39		
Physical weakness				21		
Method dissatisfaction					22	18
Failed/burst						9
Felt risky						5
Became pregnant		1	1	2		
Wanted a child	3	16	7	9	23	26
Switched to another method	5	13	5		22	40
Other reasons		4	4	17	3	2

Sources: Mostly unpublished, reported by Kapoor (1985).

^aDemographic and evaluation cells for 14 states, 1976-78.

^bDemographic and evaluation cells for 7 states (Gujarat, Karnataka, Madhya Pradesh, Punjab, Rajasthan, Tamil Nadu, and West Bengal), 1976-77 to 1980-81.

^cDemographic and evaluation cells for 11 states, 1976-77 to 1980-81.

^dDemographic and evaluation cells for 13 states, 1975-79.

^eM. E. Khan and Prasad (1983).

1980-81 (in Madhya Pradesh and Punjab), found that 50 percent of the Lippes loop acceptors and 26 percent of the Copper T acceptors had stopped using the devices by the time of the survey. The main reasons discontinuers gave were pain or bleeding, the desire to have a child, and the decision to use another method.

Among 4,128 women in 11 states who had accepted the pill sometime during the period from 1976-77 to 1979-80, four-fifths had discontinued this method when surveyed by demographic and evaluation cells. The main reasons those who had discontinued pill use gave were unpleasant side effects—specifically, giddiness and vomiting—and the desire to have a child.

A sample of 3,935 past users of the condom (known as Nirodh in India) gave as their main reasons for discontinuing the method a desire for more children, change to another method, irritation or displeasure with the condom, loss of sexual enjoyment, and lack of a regular supply. The sample was drawn from rural areas of 13 states during 1975-79 by demographic and evaluation cells. The ORG Survey of 1980-81 found the main reasons for discontinuing the condom to be a preference for a permanent method, desire for another child, preference for another temporary method, failure

of the condom, and method dissatisfaction—including interference with sexual enjoyment.

In summary, the primary reasons for discontinuing the IUD were pain and discomfort; for discontinuing the pill, physical discomfort and nausea; and for discontinuing the condom, the desire to use another method, method dissatisfaction, and the desire to have a child.

CONSEQUENCES OF METHOD CHOICE

Most family planning programs keep statistics on the annual number of new acceptors of available methods. These acceptor statistics are different from user statistics, which record the number of users of various contraceptives at a given time, owing to variation among methods in duration of use after acceptance. The acceptor data are more sensitive to program changes and are therefore preferable for program monitoring. User statistics, however, are a better indicator of a program's efficacy in reducing fertility. In India the acceptor data are routinely compiled by the Ministry of Health and Family Welfare, whereas user data are obtained from surveys.

Using certain assumptions about attrition rates and the use-effectiveness of specific methods, it is possible to estimate from acceptor data the current number of users and effective users of the methods. The Indian government computed the percentage of couples of reproductive age who were currently and effectively using various methods each year from 1970-71 to 1985-86 (Table 10.10). Using slightly different assumptions and a more detailed classification of the available methods, we have estimated couple protection rates for calendar years 1962-84 (Table 10.11). The two sets of results are broadly comparable, both indicating the dominant role of sterilization in preventing unwanted pregnancies.

We used the estimated couple protection rates for various methods to ascertain the effects of contraceptive use and method mix in reducing fertility over the period 1962-84, assuming the total fertility rate (TFR) to be 6.50 children per woman in 1962 (Table 10.11). The computations show that the program succeeded in reducing the TFR to 4.12 by 1984, a decline of 37 percent in 22 years. The change in the program strategy and contraceptive method mix in 1977 deemphasizing sterilization, especially vasectomy, is reflected in the acceptor data (Table 10.1). Beginning around 1980, acceptors of IUDs and pills, and to some extent "other" methods, increased dramatically, outpacing in percentage terms the sterilization acceptors. What would have happened if the program had not emphasized these temporary methods but had promoted sterilization instead? This question is best considered in relation to the effects of the hypothetical policy alternative on the couple protection rate and the total fertility rate. We postulate two scenarios. In the first, the number of acceptors of IUDs, pill, and "other" methods (mainly condoms) remains constant at the 1977 level until 1984.

Table 10.10. Couple protection rate (CPR) for sterilization, the IUD, and "other" methods: India, 1970-71 to 1985-86
(Official estimates)

Year	Sterilization (CPR)	IUD		Other methods		Total	
		CPR	Effective CPR	CPR	Effective CPR	CPR	Effective CPR
1970-71	8.0	1.4	1.4	2.1	1.0	11.5	10.4
1971-72	9.7	1.4	1.3	2.4	1.2	13.5	12.2
1972-73	12.2	1.2	1.1	2.4	1.2	15.8	14.5
1973-74	12.2	1.1	1.0	3.0	1.5	16.3	14.7
1974-75	12.6	1.0	1.0	2.4	1.2	16.1	14.8
1975-76	14.2	1.1	1.0	3.4	1.7	18.7	17.0
1976-77	20.7	1.1	1.1	3.4	1.7	25.3	23.5
1977-78	20.1	0.9	0.9	3.0	1.5	24.0	22.5
1978-79	19.9	1.0	0.9	3.1	1.6	23.9	22.4
1979-80	19.9	1.0	1.0	2.7	1.4	23.6	22.3
1980-81	20.1	1.1	1.0	3.3	1.7	24.4	22.8
1981-82	20.7	1.2	1.1	3.8	2.0	25.7	23.7
1982-83	22.0	1.4	1.4	4.9	2.5	28.4	25.9
1983-84	23.7	2.3	2.2	6.8	3.7	32.7	29.5
1984-85	24.9	3.0	2.9	7.7	4.4	35.6	32.1
1985-86	26.5	3.9	3.7	8.3	4.7	38.7	34.9

Source: India, Ministry of Health and Family Welfare (1988:213-214).

Notes: The couple protection rate (CPR) for a contraceptive method is the percentage of couples of reproductive age who currently use the method. The effective CPR, in addition, takes into account the use effectiveness of the method. Estimates were based on the latest age distribution of acceptors and the latest estimates of joint survival ratios of husbands and wives in various age groups. The annual attrition rate for IUD acceptors was assumed to be 37.6 percent. The annual attrition rate for vasectomy acceptors in successive five years was assumed to be 4.11, 7.14, 13.04, 18.74, and 33.50, respectively. Use effectiveness of the methods was assumed to be 100 percent for sterilization and pills, 95 percent for the IUD, and 50 percent for conventional contraceptives.

In the second, acceptors of IUDs, pills, and "other" methods in excess of those in 1977 adopt sterilization instead. Comparing these two alternatives with the actual program performance in 1984 (Table 10.12), one observes that under the first scenario the couple protection rate would be lower by 17 percent and the total fertility rate higher by 9 percent, whereas under the second scenario the couple protection rate would be higher by 12 percent and the total fertility rate lower by 9 percent. These findings suggest that sterilization acceptance has a much greater effect on program efficacy than does acceptance of the temporary methods.

The foregoing analysis has policy relevance to the current situation in India, where attempts are being made to shift the program emphasis from a concentration on sterilization to a more equitable mixture of methods.

Table 10.11. Couple protection rate (CPR) for specific methods and estimated reduction in the total fertility rate (TFR): India, 1962-84 (Alternative estimates)

Year	Vasec- tomy	Tubec- tomy	IUD	Pill	Other	Total		TFR	
						CPR	Effec- tive CPR	Esti- mated	Re- ported
1962	0.2	0.3			0.2	0.7	0.5	6.50	u
1963	0.4	0.4			0.4	1.2	1.0	6.47	u
1964	0.6	0.5			0.5	1.6	1.3	6.45	u
1965	0.9	0.5	0.3		0.5	2.3	2.1	6.39	u
1966	1.5	0.6	1.0		0.5	3.6	3.3	6.30	u
1967	2.6	0.7	1.4		0.5	5.3	4.9	6.19	u
1968	4.0	0.9	1.6		0.9	7.4	6.8	6.05	u
1969	5.1	1.2	1.5		1.5	9.3	8.5	5.93	u
1970	5.8	1.5	1.5		1.9	10.8	9.7	5.83	5.3
1971	6.6	1.9	1.5		2.3	12.3	11.1	5.73	5.2
1972	8.1	2.3	1.4		2.4	14.2	13.0	5.60	5.2
1973	9.2	2.7	1.3		2.8	16.0	14.5	5.48	4.9
1974	9.3	3.2	1.2		2.5	16.2	14.9	5.45	4.9
1975	9.6	3.8	1.3		3.0	17.7	16.2	5.36	4.9
1976	11.8	5.0	1.3	0.1	3.3	21.4	19.7	5.11	4.7
1977	14.0	6.0	1.3	0.1	2.9	24.3	22.8	4.90	4.5
1978	14.0	6.6	1.2	0.1	2.9	24.8	23.3	4.86	4.5
1979	13.5	7.2	1.3	0.1	2.6	24.7	23.3	4.86	4.4
1980	13.1	8.0	1.3	0.1	2.9	25.4	23.9	4.82	4.4
1981	12.7	9.0	1.4	0.1	3.5	26.7	24.9	4.74	4.5
1982	12.3	10.6	1.6	0.1	4.3	29.0	26.7	4.60	4.5
1983	12.1	12.7	2.1	0.4	5.6	32.8	29.9	4.36	4.5
1984	11.8	14.8	2.9	0.6	6.2	36.3	33.1	4.12	4.5

Source: Computations are by the first editor.

Assumptions:	Method	Effectiveness (%)	Discontinuation (%)	Aging (%)
	Vasectomy	100	1	3
	Tubectomy	100	1	2
	IUD	95	30	3
	Pill	100	50	1
	Other	50	50	1.7

u—unavailable.

Table 10.12. Effects on the couple protection rate (CPR) and total fertility rate (TFR) of changes in acceptors, by method: India, 1977-84

Year (1)	Estimated (2)	Scenario		$\frac{(3)-(2)}{(2)} \times 100$	$\frac{(4)-(2)}{(2)} \times 100$
		I (3)	II (4)	(5)	(6)
CPR					
1977	24.3	24.3	24.3	0	0
1978	24.8	24.7	24.8	-0	-0
1979	24.7	24.7	24.8	0	1
1980	25.4	24.9	25.3	-2	-1
1981	26.7	25.4	26.5	-5	-1
1982	29.0	26.6	29.3	-8	1
1983	32.8	28.3	34.1	-14	4
1984	36.3	30.1	40.6	-17	12
TFR					
1977	4.90	4.90	4.90	0	0
1978	4.86	4.86	4.86	0	0
1979	4.86	4.86	4.85	0	-0
1980	4.82	4.85	4.82	1	0
1981	4.74	4.81	4.73	1	-0
1982	4.60	4.73	4.54	3	-1
1983	4.36	4.60	4.19	6	-4
1984	4.12	4.48	3.73	9	-9

Source: Computations are by the first editor.

Scenario I: Numbers of acceptors of the IUD, pill, and "other" methods remain constant at the 1977 level until 1984.

Scenario II: Numbers of acceptors of the IUD, pill, and "other" methods in excess of those in 1977 adopt sterilization instead.

The greater effectiveness of sterilization in increasing contraceptive protection and reducing fertility over time seems beyond question. But the rationale for diversifying the contraceptive mix has another basis. Sterilization acceptors are usually older than other acceptors and adopt the method only after they have exceeded their desired family size. This fact has created the impression that the purpose of the family planning program is merely to prevent excessive births, thus giving it a negative image. For the program to acquire dynamism and its rightful image as a people's movement, it must also enlist younger women and encourage them to adopt methods of their own choice for spacing births. Such a positive approach to family building needs to be promoted. Simultaneously, for couples who have already exceeded their desired family size, sterilization will continue to be an effective choice.

11 Improving the Climate of Choice: The Effect of Organizational Change on Contraceptive Behavior in Rural Bangladesh

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It is a widely accepted hypothesis that family planning programs can enhance the efficacy of their services by broadening the contraceptive options they offer to rural couples. Early use-effectiveness analyses showed that contraceptive use durations were significantly extended if the option to switch methods was available (Potter 1971). Freedman and Berelson (1976) noted that overall prevalence typically increases when new methods are added to the service regimen. Since individual contraceptive preferences, beliefs, and needs vary within populations, service programs, to be effective, should accommodate the widest possible range of method preferences among potential users (see Zeidenstein 1980). The operational and policy implications of this insight are often unclear, however. Services are influenced more by bureaucratic traditions than by user needs, and therefore the question of how to expand the range of contraceptive options offered represents a challenging research issue.

The policy relevance of the programmatic determinants of choice has been the subject of considerable skepticism in the population literature. Some policy analysts question whether the management climate of programs significantly affects contraceptive behavior where the demand for services is limited. Powerful evidence from rural Bangladesh lends support to this view. Where sons are a source of security to parents and pervasive poverty impedes social change, prevailing reproductive motives are not conducive to effective fertility regulation. Despite three decades of efforts to control population growth through contraceptive service delivery, there is no evidence that the public-sector program has influenced demographic rates. To some observers (e.g., Demeny 1975) this lack of evidence strongly suggests that research on the programmatic determinants of contraceptive choice is not relevant to policy because fundamental societal factors are of overriding significance.

Skepticism also derives from the view that public-sector programs have a limited capacity to undertake change. Even if it can be demonstrated that service delivery can affect contraceptive choice, fostering change in service

organizations is a challenge where resources are limited and bureaucratic traditions emphasize conformity to rules rather than responsiveness to user needs (Simmons et al. 1983, 1986). This chapter examines these issues by assessing the contraceptive decision-making effects of a project aimed at improving the quality and intensity of contraceptive care in the Bangladesh public-sector program. Specifically, it investigates whether changes in the quality of field work can be introduced into the Bangladesh program, and whether such changes are likely to affect the contraceptive choice behavior of program clients.

THE MCH-FP EXTENSION PROJECT

Data for the analysis are from the Maternal and Child Health-Family Planning (MCH-FP) Extension Project, a cooperative venture of the Ministry of Health and Family Planning (MOHFP) and the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). The Extension Project, began in 1983, is derived from an earlier ICDDR,B project that has been in operation in a rural deltaic area, known as Matlab, since 1977. The Matlab Project was launched to test the hypothesis that family planning services could succeed in rural Bangladesh, despite social and economic conditions widely regarded as unfavorable to contraceptive practice. The Matlab Project is important because of the scientific rigor associated with its design and the potential relevance of its results to Bangladesh policy. Because the Matlab research station was originally established for the study of cholera, its demographic surveillance is unusually precise and the population under study, currently exceeding 200,000, is unusually large for a field laboratory. Owing to these special circumstances, the project design could incorporate matched treatment and comparison areas and precise longitudinal demographic monitoring of effects. By 1982 impressive evidence was available showing that treatment-area services were producing major demographic change (Phillips et al. 1982). The Bangladesh government responded to this result by requesting a test of the transferability of the Matlab service system to the public-sector program.

This new project aims to test the hypothesis that successful strategies of the Matlab Project are broadly relevant to the national program (Phillips et al. 1984). The MOHFP selected two rural districts for the Extension Project, and government workers there were instructed to collaborate with the ICDDR,B in establishing a project on the Matlab service model, but with usual government resources, rules, and procedures. Committees were established in the MOHFP bureaucracy, each charged with the task of identifying elements of the Matlab Project with some promise of replicability in the public sector, testing their introduction, reporting barriers and difficulties to central MOHFP authorities, and responding to orders for change as they arise. The Matlab Project is a source of ideas to these committees,

but much of what is done in the extension areas is developed by project-implementation committees in response to diagnoses of what works or does not work in practical field situations. Two aspects of the Extension Project design are potentially relevant to the analysis of the determinants of contraceptive choice: the role of outreach workers in influencing choice behavior and the role of project activities aimed at improving the quality and quantity of care provided by these workers (see Phillips et al. 1984).

Both the Matlab Project and the government's nationwide program embrace a policy of free contraceptive choice—the “cafeteria approach.” In contrast to the government program, however, the Matlab Project has a field strategy explicitly designed to maximize the range of contraceptive methods readily available. A cadre of young, married, literate, and contracepting women visits households in Matlab every two weeks to ascertain contraceptive preferences, encourage couples to adopt, and arrange services in the most convenient fashion possible. (The design of the Matlab Project is described by Bhatia et al. 1980, and the impact of the project is assessed in Phillips et al. 1982.) These village workers provide oral contraceptives, condoms, and depot-medroxy-progesterone acetate (DMPA) injections to clientele upon request in the course of their household visits. Paramedics provide Copper T (IUD) services to women in their homes. Referral services for sterilization are available in a nearby clinic in Matlab.

The Matlab administrative system lends support to this cafeteria orientation to contraceptive care. Rigorous service coverage objectives are strictly enforced, but no contraceptive acceptor targets are imposed on Matlab workers. This policy fosters the concept of orienting services to meet client needs rather than to fulfill demographic objectives. Accordingly, the workers are trained in techniques for establishing rapport with clients and are instructed to emphasize the contraceptive options available rather than to promote a particular modality. Workers' salaries are unrelated to contraceptive modalities adopted by their clientele, although the government pays a standard allowance to all sterilization patients to cover perioperative costs of transportation and convalescence.¹ The Matlab Project, with its well-developed logistics system, can readily support the provision of methods, such as DMPA, that require peripheral supplies and equipment not available through the government program. In the Matlab system, 20 female workers are assigned to a “union,” a unit of local government for a cluster of about 20 villages with an average population of 28,000. In the MOHFP system there are three such workers per union. The greater worker den-

1. The number of tubectomies in Matlab has fallen to low levels in recent years, because most couples who were motivated to terminate their fertility adopted this method in the first two years of the program. Although sterilization contributes to the effectiveness of the Matlab Project, overall results derive primarily from the provision of reversible contraception and to the contribution of services to spacing behavior (Koenig et al. 1987).

sity in Matlab permits more rigorous standards of care and follow-up than is possible in the government system. This advantage may enable it to expand the availability of reversible methods, contribute to spacing behavior, and thereby influence the climate of contraceptive choice. An important element of its program of support for spacing is the rigorous system of follow-up. Multiple options are available to adopters, and users who are dissatisfied with one method are encouraged to choose another rather than to terminate practice altogether.

The emphasis on expanding the climate of method choice in Matlab contrasts with policies of the MOHFP. In the MOHFP system, each worker is assigned a fixed quota of adopters to recruit for each method every month. An unintended dysfunction of this policy may be to convey to workers the notion that the climate of choice is a worker's responsibility rather than the client's. This element of worker control over method choice may be exacerbated by other policies that can be interpreted as biasing the climate of choice. For example, for sterilization referrals the government pays a fee to workers who accompany clients to clinics and attend the patients in the postoperative period. It also pays an allowance to clients to cover their peri-operative costs. Government paramedics receive a modest insertion fee for each Copper T insertion. Whether such fees are substantial enough to represent an "incentive" is the subject of debate in Bangladesh and abroad, but the payment of fees, together with the fixed method-specific target scheme, may convey to workers, at various levels, the notion that long-acting methods have priority. Although the target scheme applies to all methods, the sterilization targets have been the most controversial aspect of this policy because demand for sterilization is presumably finite, but no allowance is made for past caseload or the climate of demand for this modality. There is little doubt, nevertheless, that the sterilization program has been a major success.

Some critics of the Bangladesh program argue that administrative and institutional constraints hamper efforts to replicate the success of the sterilization program for reversible methods and constrain attempts to replicate the Matlab system for providing nonclinical methods. Many government personnel lack the technical skills to provide comprehensive services or the resources to cover service areas effectively. Limitations of the supervisory and logistics systems may exacerbate the limited capacity of MOHFP staff to conduct outreach activity, preventing even the most dedicated field workers from providing comprehensive contraceptive care. (See Koblinsky et al. 1984; Huque et al. 1984.)

The Extension Project has been designed to assist the government to identify such operational deficiencies and to determine whether requisite changes in the service system can be undertaken, whether doing so alters the climate of contraceptive choice, and how operational changes affect program impact. Its field activities comprise three interventions. First, com-

mittees at the subdistrict level address project planning and direction issues. Their activities represent an intervention in the sense that management capabilities have been introduced in the course of this joint work that were not previously in place. Second, training courses for primary service providers and their supervisors involved two weeks of classroom sessions on contraceptive technology, service delivery techniques, and management techniques, collectively termed the "training only" cell of the experiment. Third, although training was conducted in all intervention areas of the Extension Project, a "counterpart-support" condition was designated in half of the project treatment area, where service workers from the Matlab area were assigned as temporary counterparts to their government colleagues. The counterparts were instructed to provide to Extension Project workers on-the-job orientation to the Matlab concepts of service delivery, household communication, and task planning. In addition to the training-only and counterpart-support areas, a third area of the Extension Project has had no special interventions.

The central aim of this system of intervention and evaluation is to improve the quantity of care by intensifying outreach services and broadening the knowledge and skills of household visitation workers. Government workers provided the services, using usual budgetary provisions and standard administrative procedures of the public-sector bureaucracy. Nonetheless, certain changes have been introduced, with priority consigned to strategies that have been successful in Matlab and are consistent with existing government policy. The delineation of training-only areas versus training-plus-counterpart-support areas permits statistical tests of the effect of direct field involvement of Matlab workers relative to a less intensive ICDDR,B intervention. In practice, it permits comparison of the consequences of actually introducing change with the effects of relatively benign inputs by Matlab external staff. The nonintervention control area permits assessment of overall project impact.

The counterpart-support strategy was implemented by training Matlab village workers and supervisors along with their government colleagues. The training course was designed to introduce workers in both training-only and training-plus-counterpart-support areas to systems of visitation scheduling, record-keeping, logistics, and support services that were developed in Matlab. After the course, Matlab staff and government counterparts worked as a team for a 90-day period on routine service tasks, with the aim of introducing lessons from the course into the routine work regimen.

ANALYTICAL FRAMEWORK

To assess the effects of the Extension Project on choice required simultaneous consideration of social and behavioral determinants and the effects of the supply system. For this purpose, we specified three sets of determinants

of choice behavior: societal, organizational, and individual. Societal determinants represent institutional conditions affecting program-organizing capabilities and reproductive behavior. At the individual level, the most proximate consequences of such determinants in Bangladesh are the low levels of female educational attainment and the pervasive poverty. Although societal constraints undoubtedly affect the capacity of programs to organize services effectively and to adapt services to users' needs, net programmatic effects may arise from service activities. Thus, we posited that organizational capabilities, although affected by societal influences, and program variables exert a net influence on contraceptive behavior at the individual level.

We also posited educational attainment and household economic status to affect reproductive preferences and contraceptive awareness, each, in turn, representing interdependent influences on contraceptive decision making. Although reproductive preferences might affect choice behavior indirectly through effects on contraceptive awareness, preferences were posited to have direct effects. Knowledge and beliefs about methods, key intermediate variables in the analysis, were hypothesized to be affected by two sets of variables: the social and economic background of couples and the intensity and quality of services. Thus, service operations were posited to affect choice behavior indirectly through program effects on relative accessibility. Accessibility of reversible contraception would be affected mainly by the intensity of outreach services and by the quality of counseling about the options available.

For the present analysis, we used longitudinal records of women's recollections of the intensity of services they received during visits of government workers to sample households in the course of a 90-day period. Service quality was measured indirectly by indicators of whether workers in sample areas were trained or provided with counterpart support. The underlying hypotheses of this specification were that the number of the exchanges that took place between outreach workers and respondents would be affected by the system of management information, supervision, and worker motivation and that project activities affected these aspects of the service system. Thus, net conditional effects of contact and treatment variables were specified in our estimation of effects, the contact effects representing the impact of the amount or extent of outreach effort, and treatment effects representing the net effect of incremental improvements in service quality. Joint effects assessed the extent to which the climate of service quality introduced by treatments was conditional on the intensity of worker-client exchanges.

METHODOLOGY

The longitudinal data on choice behavior came from a sample of 6,822 women observed over the 1984-85 period who were nonusers in 1983. We

assumed choice to be a process of selection among competing options over time as defined by the 90-day probability of a change in contraceptive use status from not using any modern method to using one of five modern methods: the pill, condom, Copper T, DMPA, or sterilization (mainly tubectomy). Each of the individuals in the analysis was observed over a one-year period.

The analysis took into account the following considerations. First, choice patterns can change with time, so that effects can be time-conditional. For example, the mobility of government service workers may be affected by the monsoon, and the receptiveness of clients to services is affected by the harvest cycle. Second, longitudinal data are censored in that women observed in one round may or may not be observed subsequently. Third, effects of independent variables can be viewed as predetermined or time-conditional, depending upon the type of effect to be estimated. For example, reproductive preferences in the baseline period can be viewed as determinants that underly the choice process as a constant effect with time. Other effects, such as treatment interventions or worker contact, may have behavioral consequences but are appropriately estimated from time-conditional indicators. Fourth, effects on choice arise not only from covariates, but also from experience with past choices, particularly if side effects are associated with use of a method. Last, of the estimated effects, some represent attributes of service areas or communities whereas others represent characteristics of individual contracepting couples. Our analysis was therefore appropriately multileveled.

Binomial logit (Walker and Duncan 1967) and multinomial logit (Chapter 15, by Choe; Theil 1969) models were used to estimate effects of baseline characteristics of women, baseline reproductive preferences, operational variables, and treatments on the adoption of contraception and on the choice of contraceptive methods.²

Owing to the absence of any evidence of systematic time effects and problems with achieving convergence when time was entered as a covariate, we reduced the time effects to a scalar in the estimation, an implicit assumption of constant time effects. Although this assumption was imposed on the present analysis by computational problems, such effects are unlikely to be substantively important, except in the sense that the estimates derived below were quite possibly seasonal.

The interventions that take place by treatment area and time are coded as follows. If workers are untrained, the variable for "training effect" is 0 until the training course is completed and 1 thereafter. For contact indicators, a score of 1 denotes one or more visits in the person round and 0 other-

2. We dealt with censoring in the current analysis by excluding censored person rounds from the data matrix. The program used for the analysis was developed for the IBM Personal Computer by Leon (1985).

wise. Thus, contact effects were treated as ephemeral and intervening, whereas treatments were assumed to be lasting areal effects delineated by the work zones of primary service providers and defined by the types of organization development strategies pursued by the Extension Project in the area where a given respondent resided.

THE DATA

The data for the analysis were extracted from the Sample Registration System (SRS), a longitudinal data base established in October 1982 to provide the requisite data for evaluating the MCHFP Extension Project. Each "round" of the SRS consists of visits of teams of ICDDR,B male and female interviewers to approximately 19 percent of the households in 13 sample areas comprising administrative units termed "unions." A round is completed within 90 days. (An overview of the SRS design appears in Mozumder et al. 1986.) Data on current demographic rates and worker-client contact rates can be readily linked with baseline information on respondent demographic characteristics, reproductive preferences, contraceptive use intentions, and current practice. With such data, it is possible to examine the relationship between contraceptive use dynamics and service outreach intensity, adjusting for the possible contaminating effects of clientele characteristics.

Relative economic status is represented by two factor scores derived from 20 indicators of household wealth.³ The first score is weighted most prominently by attributes of economic status that are inherited in early adulthood (landholding, household construction type and floor space, and sources of income directly related to land). The second scale is weighted primarily by occupations unrelated to landholding (such as trade and professional occupations) and by possession of consumer durables. The second scale identifies a growing nonagricultural elite engaged primarily in trading and service occupations (see Hossain and Phillips 1984).

Baseline characteristics for SRS respondents were compiled over the period from October 1982 to March 1983. Our analysis examined respondents' contraceptive behavior over a one-year period after the service interventions were launched in mid-1983. Table 11.1, which presents differential characteristics of users and nonusers of modern contraception among married women of reproductive age, shows that characteristics of SRS respon-

3. Of the 1,832 SRS baseline user and person rounds in the sample, 1,480 corresponded to continuing use or readoption of one of the five modern methods over the year between April 1984 and March 1985. In an analysis of use dynamics among baseline users (not presented here), the magnitude of coefficients and signs differed from corresponding estimates for nonusers. Thus, to include all women in the sample, multiple interactions would have been required—a procedure that is computationally intractable owing to the need of simultaneously assessing the determinants of discontinuation and adoption. Therefore, we eliminated baseline users from the sample.

Table 11.1. Baseline characteristics of users and nonusers in the SRS sample: Bangladesh, October 1982

Characteristic	Users (N = 1,153)		Nonusers (N = 5,669)		All women (N = 6,822)	
	Mean	Standard devia- tion	Mean	Standard devia- tion	Mean	Standard devia- tion
Continuous variables						
Age	30.5	7.5	28.8	9.6	29.1	9.3
Education (years)	2.1	3.0	1.0	2.1	1.2	2.3
Number of children ever born	4.6	2.6	4.0	3.2	4.1	3.1
Categorical variables (percentage distribution)						
Religion						
Muslim	76		89		87	
Others	23		11		13	
Want more children?						
Yes	16		29		27	
No	84		71		73	
Intend to contracept?						
Yes	100		45		54	
No	0		55		46	
Know source of supply or services?						
Yes	96		83		86	
No	4		17		14	
Contacted by male worker during past 90 days?						
Yes	56		48		50	
No	44		52		50	
Contacted by female worker during past 90 days?						
Yes	48		37		39	
No	52		63		61	

Note: Total number of person rounds observed was 1,832 for users and 15,522 for nonusers.

dents did not differ appreciably from the characteristics of women elsewhere in Bangladesh. The sample comprised young, high-parity women who had an average of 1.2 years of schooling. Illiteracy was high and economic activity was dominated by farming, handicrafts, and trading. The proportion of respondents who were not Muslim in the sample population was similar to the national average. Nearly all non-Muslims in Bangladesh are Hindus. Seventy-three percent of the baseline respondents wanted no more children, although only 17 percent were contracepting. Among noncontracepting women, 45 percent stated that they intended to use a method in the future. Knowledge of methods was nearly universal, and most respondents were aware of sources of supplies and services (86 percent). Half of the respondents had been contacted by a male worker and nearly two-fifths had been contacted by a female worker in the 90 days prior to the baseline survey. The baseline data thus suggest that household services were being provided prior to the study.

RESULTS

The Binomial Logit Model

The analysis in Table 11.2 presents a bivariate model of adoption of contraception. The coefficients, presented with corresponding standard errors, are maximum-likelihood estimates of the effect of the variables on the choice of any method. The regression in Table 11.2 is based upon the experience of nonusers in the 90-day period prior to project interventions. The global statistics presented test the hypothesis that choice of any method is unrelated to the independent variables included in the model—in other words, they test whether further analysis of the determinants of choice behavior is necessary. As the data show, further exploration of the determinants of choice was warranted. The likelihood ratio chi-square statistic was large and significant, indicating that the model fit the data.

The analysis shows that parity directly affected the odds of adoption. Once parity effects were held constant, however, age effects were negative. Thus, women who achieved relatively high parity for their age were more likely to contracept than other women. Somewhat surprisingly, educational attainment had no effect. Hindus were more likely to contracept than Muslims. Economic status indices related directly to the odds of use. Of the client characteristics incorporated into the analysis, contraceptive use intentions and reproductive intentions were the most strongly predictive of subsequent behavior.

The binomial coefficients in Table 11.2 also suggest that operational variables were important determinants of contraceptive use among baseline nonusers, although the effects are complex to interpret owing to the interactions involved. The model assesses the main effect of client-worker

Table 11.2. Binomial logit regression coefficients for the effect of baseline characteristics of women, baseline reproductive preferences, operational variables, and treatments on adoption of contraception: Bangladesh, 1982

Characteristic or variable	Coefficient	Standard error
Baseline characteristics		
Age	-.128†	0.008
Number of children ever born	+.241†	0.025
Education	+.010†	0.020
Religion	-.653†	0.102
Economic status		
Index of land holding	+.167†	0.044
Index of modern possessions	+.135†	0.039
Baseline reproductive preferences		
Want more children	-.704†	0.101
Intend to contracept	+.664†	0.092
Operational variables		
Baseline knowledge of supply source	+.206†	0.122
Worker contact		
Male	-.129	0.178
Female	+.653†	0.161
Treatments		
Counterpart support and training	-.314†	0.183
Training only	-.523†	0.169
Interactions		
Male contact training	+.617*	0.212
Male counterpart support	+.443*	0.220
Female contact training	+.484*	0.207
Female counterpart support	+.480*	0.218
Male and female counterpart support	-.214	0.173

Notes: Log likelihood = -2,362.0; likelihood ratio statistic = 311.15 (17 d.f.)†; number of cases = 682; number of observations = 10,404.

* $p < .05$.

† $p < .01$.

exchanges by gender of worker, the main effect of each treatment, the conditional effects of treatment by gender of worker, and the joint effects that arose when clients were visited in a 90-day period by workers of both genders. To control for client knowledge of service sources, we also incorporated into the model a baseline variable for knowledge of a supply point. Specified interactions tested the hypothesis that components of service operations defined a context in which other effects arose.

The binomial logit coefficients in Table 11.2 attest to the appropriateness of this complex specification. The coefficient for the main effect of male worker visits was not significant, but the female worker contact effect was pronounced and significant irrespective of treatment, as demonstrated by the strongly positive main effect. Apart from the joint effects of treatments with contact worker, counterpart support had a positive impact, whereas training in the absence of counterpart support was effective only among male workers.

The negative main effects of the treatments attest to the importance of outreach in rural Bangladesh, where demand for contraception is weak. In the absence of household visits by outreach workers, the experiment had no impact. Where visits of male or female workers occurred, however, the effects of treatment were manifest. But where both male and female workers visited, the effect was no different from the additive effects of each worker visiting independently. This result was to be expected since male and female workers rarely work as a team, and joint effects arose from the random concomitance of visits to the same household in a 90-day period.

Table 11.2 shows that the intensity of interchange between female workers and women clients contributed directly to contraceptive use and that, together with the estimated joint effects, the effect of female worker contact was more pronounced than the effect of contact with male workers. These findings lend support to the conclusions of previous studies from the Extension Project, which have emphasized the critical role of female service providers, and to the recent decision of the MOHFP to greatly increase the size of its female service provider cadre. Contact by male workers in counterpart support pairs had less effect on the odds that a woman would use a contraceptive method than did similar visits by female workers in areas where only training took place.

Three explanations can be advanced to explain the gender differences in worker efficacy. First, observational studies and analyses of data on the exchanges that take place between workers and clients suggest that male workers only rarely discuss family planning and almost never offer a service to women directly. Male workers were originally hired for smallpox and malaria campaign duties, and they have retained a strong identification with the health service campaign. Second, it is culturally impermissible for men to discuss family planning freely with women in rural Bangladesh, and this taboo greatly restricts their potential role as family planning outreach workers. Third, the economic roles of men differ markedly from those of women in rural Bangladesh, and gender roles affect work orientation. Bangladeshi men are under intense familial pressure to engage in economic activities outside their formal jobs, but the male workers in the Extension Project were obligated by the rules of the project to cooperate with their female counterparts and accompany them into the field for routine work, thus exposing themselves to possible economic adversity.

Given this unprecedented form of pressure on the men to do their formal jobs, the null effect is not surprising. Although the counterpart support approach helped female workers, field observations indicated that male workers resented the introduction of Matlab staff into their work areas, viewing the project as forcing them to work, whereas no such supervisory pressure had existed previously.

It is clear from observational data and in-depth client interviews, moreover, that Bangladeshi wives typically consult their husbands on contraceptive decisions but often cite their husbands as the obstacle to adoption or a particular method choice. The untrained or recalcitrant male field worker may achieve little more than activating this dynamic between husbands and wives. The coefficients suggest that training may have neutralized this negative effect of male household contact but that the role of male workers in family planning is nevertheless weak and inconsequential.

Table 11.3 presents treatment and worker-contact effects as transformed into estimated quarterly effects of each specified variable on the prevalence rate, with characteristics of users held constant at mean values. The effect of male worker contact on use was negligible irrespective of area because the positive conditional effects of treatment were offset by negative main effects of male worker contact. Thus, male visitation effects in training and counterpart areas were roughly equivalent to male worker effects in the comparison area ($-.14$ and $+.00$, respectively, versus $-.49$ in the comparison areas). In contrast, female household visits were consistently related to adoption, particularly in counterpart support areas ($+4.87$). Female workers in counterpart support areas, if left to conduct their work in 90-day visitation rounds, added about 5 percent to the prevalence rate with each

Table 11.3. Expected mean quarterly change in the post-baseline contraceptive prevalence rate, by type of worker and treatment: Bangladesh, 1982

Treatment	Effect of one client contact in a 90-day period, by specified worker				Gross effects of treatment ^a
	Male worker	Female worker	Both	Neither	
Training only	-0.14	+3.31	+1.74	-1.67	+1.37
Counterpart support and training	+0.00	+4.87	+1.92	-1.10	+3.09
No intervention	-0.49	+3.59	-0.79	0.00	0.00

Notes: Expected mean quarterly change is expressed as a net quarterly deviation from the expected trend in the absence of any intervention. Effects control for possibly confounding effects of baseline characteristics.

^aThese effects allow for observed rates of worker contact.

household contact. Given the low density of such workers (only three in an area with a population of 25,000 to 30,000), such exchanges were infrequent, averaging only one in five months. The results demonstrate, however, that the effect was pronounced when such encounters occurred.

Such effects were similar to the effects of the Matlab Project in its first year. It is entirely possible that the Matlab Project derives its impact primarily from the frequent exchanges between its female workers and their clientele, and only secondarily from the unique technical skills of its workforce, imparted by the strong training and management system. The seemingly pronounced effects of female worker contact found in treatment areas arose because strong main effects in the log odds produced even stronger effects when the log odds were transformed into probabilities. These findings thus demonstrated a pronounced relationship between female worker contact and adoption even in comparison areas. With counterpart support, the female effect was substantially greater than in training-only areas or comparison areas. Where no programmatic effort was expended, the odds of use were low as reflected by the negative or null effects in the three rows of the "neither" column in Table 11.3. The estimated "gross effects of treatment" illustrate the nature of organization development effects. When the effects of contact were ignored, treatment effects were found to be positive and significant. Thus, the experiment has had an effect on contraceptive use, but this effect arises entirely from intensifying the frequency of worker-client exchanges, most prominently exchanges initiated by female outreach workers.

The Multinomial Logit Analysis of Choice

Since the relationships identified by the binomial model are complex, interpreting corresponding multinomial logit coefficients is unwieldy. Nevertheless, aspects of the multinomial logit coefficients are instructive (Table 11.4). Signs assess the relative effect of a given covariate on choice. We found the effects of age, net of parity, to be consistent across methods, suggesting that age did not greatly affect method choice. Sign reversals across rows for educational attainment show that the odds of adopting reversible methods, with the exception of DMPA, increased with educational attainment and decreased for sterilization, the preferred method among less educated women. The odds of choosing sterilization was inversely related to economic status on one scale, an index of land holding, but directly related to it on another, an index of modern objects possessed. Hindus were more likely to choose sterilization than Muslims. Not surprisingly, reproductive intentions and a desire for no additional children were strongly related to subsequent choice of sterilization and the IUD.

The main effects of counterpart support were pronounced for adoption of sterilization, an unexpected finding given the program's emphasis on

Table 11.4. Estimated coefficients, standard errors, and likelihood statistics for the effects of baseline characteristics of women, reproductive preferences, operational variables, and treatment strategies on contraceptive choice among baseline nonusers subsequently adopting a method: Bangladesh, 1982
(Reference category = no use)

Covariable	Any method	Pill	Condom	Copper T	DMPA	Sterilization
Respondent characteristics						
Age	-.082† (0.007)	-.101† (0.017)	-.070† (0.022)	-.165† (0.019)	-.096† (0.020)	-.024* (0.101)
Number of children ever born	+.178† (0.019)	+.238† (0.041)	+.166† (0.054)	+.252† (0.047)	+.201† (0.049)	+.091† (0.027)
Education	+.067†	+.140† (0.023)	+.094† (0.031)	+.111† (-.035)	-.006 (0.024)	-.066† (0.012)
Religion	-.551† (0.074)	+.324 (0.197)	+.542 (0.300)	-.910† (0.135)	+.938† (0.268)	-1.142† (0.103)
Economic status						
Index of land holding	+.103† (0.031)	+.342† (0.062)	+.532† (0.085)	+.289† (0.063)	+.016 (0.076)	-.323† (0.054)
Index of modern possessions	+.148† (0.027)	+.242† (0.057)	+.392† (0.080)	+.026 (0.057)	-.041 (0.069)	+.122† (0.042)
Baseline reproductive preferences						
Want more children	-.788† (0.074)	-.322* (0.149)	-.231 (0.211)	-.688† (0.139)	-.394* (0.178)	-1.354† (0.142)
Intend to contracept	+.977† (0.063)	+.644† (0.132)	+.568† (0.188)	+.982† (0.121)	+.698† (0.158)	+1.002† (0.097)
Operational variables						
Baseline knowledge of supply source	+.833† (0.113)	+.620* (0.255)	+1.160* (0.460)	+.630* (0.250)	+.481 (0.254)	+1.002† (0.181)

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Worker contact						
Male	-.053 (0.104)	-.492* (0.202)	+.179 (0.270)	+.143 (0.237)	+.699 (0.433)	-.043 (0.162)
Female	+.615† (0.101)	+.636† (0.183)	+.628* (0.266)	+.904† (0.235)	+3.113† (0.744)	+.060 (0.163)
Treatment effects						
Counterpart support and training	+.322† (0.118)	-.408 (0.319)	+.114 (0.372)	+.289 (0.239)	+.483 (0.403)	+.477† (0.172)
Training	+.035 (0.101)	-.395* (0.200)	+.161 (0.286)	+.598* (0.241)	+2.439† (0.777)	-.229 (0.153)
Interactions						
Male contact training	+.510† (0.135)	+.915† (0.274)	-.203 (0.366)	+.304 (0.296)	-.805 (0.487)	+.756† (0.211)
Male counterpart support	-.357† (0.135)	-.147 (0.337)	+.132 (0.484)	-.369 (0.264)	+.106 (0.297)	-.638† (0.212)
Female contact training	+.001 (0.133)	-.413 (0.262)	-.210 (0.363)	-.584* (-.295)	-.939 (0.792)	+.292† (0.213)
Female counterpart support	+.065 (0.138)	+.414 (0.353)	-1.339† (0.504)	+.331 (0.273)	+.162 (0.422)	-.380 (0.212)
Constant	-1.490 (0.212)	-3.296† (0.476)	-5.660 (0.735)	-1.456† (0.479)	-7.435† (0.909)	-3.036† (0.321)
Multivariate log likelihood	-4,636.071	-1,365.728	-768.751	-1,382.603	-953.909	-2,281.118
Likelihood ratio statistic	1,088.771	285.255	171.349	459.922	427.270	505.106
Number of cases	1,614	307	152	334	223	598
Number of observations:	15,522					

* $p < .05$.

† $p < .01$.

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reversible contraception and the introduction of DMPA. Also unexpected was the effect of training on DMPA use, to the virtual exclusion of effects on other methods. The multinomial coefficients for female worker effects were consistently positive, more prominently for temporary methods, and most dramatically for the adoption of DMPA. This finding suggests that if contact is established between female workers and clientele, the prevalence rate will increase for all methods, moderately so for sterilization, but dramatically so for methods that can be dispensed by female workers in clients' homes. That the effect of female visitation did not necessarily depend on training or counterpart support suggests that increasing the rate of female workers' contact with clients is likely to have a greater effect on adoption and method choice than efforts to improve the management system. It should be noted, however, that interpreting interaction effects requires computation of all effects entering the cell of a table. That is, since the logistic distribution is nonlinear, strong main effects can produce pronounced conditional effects in the probability metric even if interactions are weak. This point is illustrated below.

The multinomial logit coefficients from Table 11.4, transformed into the estimated method mix presented in Table 11.5, express the expected method-specific prevalence rates for each variable, holding constant other effects. Comparisons across rows show the net method-mix effects of the variable in question. The first pair of rows, for example, examines age effects by computing the expected method mix among women one standard deviation older than the mean age versus the corresponding mix for women one standard deviation younger than the mean. The expected mix is the predicted percentage distribution of methods, holding constant potentially confounding effects of other variables. Thus, older women, in this case, would adopt sterilization whereas younger women would adopt the Copper T. The reverse is true for parity once age effects are controlled: a lower proportion of the young, high-parity women than of older, higher-parity women who choose to contracept would choose sterilization. Thus, age, net of parity, would be inversely related to adoption, but positively associated with the choice of sterilization once the decision to adopt has been taken. Parity effects evince the opposite pattern: as the number of children ever born increases, the adoption rate would increase. However, among those who adopt, a method choice would be more evenly distributed across the options available with increasing parity.

Although the practice of contraception is directly related to level of education and economic status, adopters with no formal education and women from poorer households would be more likely to choose sterilization than would higher-status women, who would tend to prefer reversible methods such as pills or the Copper T. Although adoption rates are relatively low among women of lower economic status, those who do adopt are likely

to be more motivated to contracept, more cognizant of demographic pressure on the household, and thus more likely to choose permanent methods than other women.

Reproductive preferences had effects consistent with the hypothesized relationships. The stated desire to terminate fertility strongly affected decisions to adopt, as indicated by the marginal predicted mean. This variable, because it refers to general intentions to contracept, however, discriminates weakly among choices available. Similar effects are observed for the variable on baseline knowledge of a supply point or service location: knowledge of where services could be obtained affected adoption, but effects on choice were not pronounced.

Conditional effects for worker contact and treatment in Table 11.4 have been transformed into the probability metric and presented in Table 11.6, which shows the expected method mix (corresponding to Table 11.3 adoption effects), controlling for the client characteristic effects illustrated in Table 11.5. It shows that the climate of service delivery apparently affects the climate of choice. Project intervention effects are nevertheless complex owing to the interactions involved. Gender of worker and of contact is a more proximate determinant of choice than experimental interventions. This conclusion is suggested not only by the contrasting method mix across gender rows but also by the less substantial differences between treatments.

Results reported in the treatment rows of Table 11.6 strongly suggest that female contact is associated with a broader range of method choices than is contact by male workers. Thus, contact by male workers not only detracted from acceptance, it also tended to select adopters for sterilization. This finding also applies to the effects of worker's gender in the cell for counterpart support: male worker contact, although weakly associated with adoption, was associated with choice of sterilization. This effect may be related to the recent dramatic increase in the proportion of vasectomies among sterilizations and to the obvious potential for male workers to support that program. Nevertheless, evidence that male worker contacts detract from acceptance and that choice among male worker clientele tends to be method-specific is cause for concern and merits further investigation. Although treatment effects on choice were weak, the gross effect on choice of a counterpart support strategy or training strategy resulted in a lower proportion of sterilization adoption than in areas where project intentions were not introduced.

IMPLICATIONS

The Extension Project was launched to test the hypothesis that elements of the Matlab service system were transferable to the public-sector program without incremental resources or structural changes. The results suggest that the prospects for introducing organizational change in the public-sector

Table 11.5. Adjusted percentage distribution of women, by method chosen, as predicted from multinomial logit coefficients, for selected determinants of contraceptive choice: Bangladesh, 1982

	Adjusted method mix expressed as percentage of adopters, by chosen method						Predicted percentage of baseline nonusers using any method ^a
Variable	Pill	Con- doms	Copper T	DMPA	Steriliza- tion	All methods	
Respondent characteristics							
Age ^b							
36.8	16	9	8	5	62	100	3.4
20.0	24	8	34	7	26	100	12.0
Number of children ever born ^b							
1.0	26	10	23	7	34	100	9.8
7.1	17	9	14	6	54	100	3.6
Education (years)							
3.3	27	11	21	6	35	100	6.4
0.0	17	8	15	7	53	100	5.6
Religion							
Hindu	13	6	10	4	67	100	10.0
Muslim	16	6	38	3	38	100	6.0
Economic status ^b							
Index of land holding							
+1.0	30	16	24	7	22	100	5.8
-1.0	16	6	14	7	58	100	5.9
Index of modern possessions							
+0.0	24	12	16	6	42	100	6.0
-1.0	20	8	20	8	44	100	5.1

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Baseline reproductive preferences

Want more children

Yes	30	14	19	8	29	100	3.4
No	19	8	17	6	50	100	7.4

Intend to contracept

Yes	18	8	20	6	48	100	11.9
No	22	10	18	7	43	100	5.1

Operational variable:

baseline knowledge of supply source

Yes	20	10	17	6	47	100	6.6
No	26	7	21	9	37	100	2.9

Note: Percentages may not sum exactly to 100 because of rounding.

^aThe estimated grand mean is 8 percent of baseline nonusers who were SRS current users.

^bContinuous variable predicted mean effects are computer by adding and subtracting one standard deviation from sample means.

Table 11.6. Expected percentages of women using each method, by treatment condition and type of worker contact: Bangladesh, 1982

Condition	Predicted percentage of users, by method chosen					
	Pill	Con- doms	Copper T	DMPA	Steriliza- tion	All meth- ods
Training only						
Male worker contact	22	8	22	4	44	100
Female worker contact	14	10	14	34	29	100
No contact	22	12	20	8	39	100
Counterpart support						
Male worker contact	13	18	14	3	52	100
Female worker contact	29	3	24	14	30	100
No contact	16	9	11	1	64	100
No intervention						
Male worker contact	21	13	14	1	50	100
Female worker contact	35	11	16	8	30	100
No contact	31	10	11	1	47	100

Notes: For all covariates except treatment condition and type of worker contact, mean values were substituted in the model. Percentages may not sum exactly to 100 because of rounding.

program's field operations are better than many observers of the Bangladesh program anticipated and that the change would have positive effects on contraceptive use, most prominently if counterpart support were added to training. The treatment effects would be conditional on outreach visits by service workers, and the magnitude of effects would depend on the gender of workers.

The findings lend support to the recent MOHFP decision to increase the female workforce. This strategy will not only directly affect program performance, it will also interact with other efforts to introduce improvements in the service system. Most notably, it will increase the extent to which clientele rely on reversible contraception. The Extension Project demonstrates that method choice is determined both by the characteristics of users and by the climate of choice in the service program. This climate of choice, in turn, can be influenced by improvements in the system of service delivery to increase the frequency of clients' contact with female workers. The decision to increase the number of female workers in the program thus has potential ramifications for management information, field logistics, and supervision, since the newly expanded workforce will place demands on the system that are likely to be very different from the logistics demands of the current program. Program supervision and field support must also adapt to the possibility that follow-up, resupply, and clinical backup will be more important than they have been in the past.

Finally, the findings suggest that program performance can be improved with operational changes, even without major increments in staff or other external resources. This finding must be interpreted with caution, however. The Extension Project's experience will be replicated on a large scale only if concerted efforts to improve the quality and content of services can be sustained by administrative commitment to the improvement at all levels of the MOHFP hierarchy. Building such a commitment through broader experimentation with change, in particular by involving several levels of the administrative system, is needed before it can be concluded that the package of Extension Project activities can be replicated nationwide. Nevertheless, the finding that the Extension Project's impact has been significant, and that field work plays a critical role in contraceptive choice, suggests that there is considerable potential for developing the Bangladesh service system in the future.

Initial results from this project are thus encouraging. Interventions have increased the odds of contraceptive use and the odds that adopters will choose reversible methods, thereby expanding the range of choices. If the Extension Project's improvements in service can be replicated on a national scale, the wider range of contraceptive preferences will be addressed, and overall program efficacy will improve.

ACKNOWLEDGMENTS

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PART III
METHOD CHOICE
IN THE UNITED STATES

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12 Contraceptive Choice in the United States: Process, Determinants, and Change

*by Ronald R. Rindfuss, C. Gray
Swicegood, and Larry L. Bumpass*

After more than a decade of below-replacement fertility in the United States, contraceptive choice may no longer seem to be a subject of interest to American social demographers or policymakers. A wide variety of contraceptive choices is available, and most women in the United States are protected by highly effective and coital-independent methods. Nevertheless, the prevention of unplanned pregnancy is far from perfect. Though it has been reduced, ill-timed and unwanted fertility is still a common experience in the lives of women and families. Almost half of all ever-married women still experience at least one ill-timed birth, and about one of every ten have another birth after intending never to have another child.

In this chapter we examine the current choices that white, non-Hispanic American women and their spouses are making, the determinants thereof, and the changes that have occurred in the structure of those determinants between 1976 and 1982. The focus is on social and demographic factors and on current choice. Current choice, however, arises from a process that typically begins in one's teenage years. We turn first to a consideration of that process.

CONCEPTUAL FRAMEWORK

Contraception is the deliberate use of a technique or device to prevent a conception. An inquiry into the determinants of contraceptive use is, by its very nature, a conditional one. Only those who intend to prevent conception—that is, only those who want no more children or who wish to postpone a birth—are subject to the decision to practice contraception. Those who are faced with a contraceptive choice may choose from a variety of contraceptive methods as well as no method. This conditional context is illustrated in Figure 12.1.

We assume that the intention decision precedes the contraceptive choice decision. One may argue that the two decisions are made simultaneously or that in some cases the contraceptive decision is made first (see, e.g., Rosenzweig and Seiver 1982). At face value, however, such an assumption seems implausible. The seriousness and costs attached to the two sets of decisions are markedly different. To be weighed against the relatively minor

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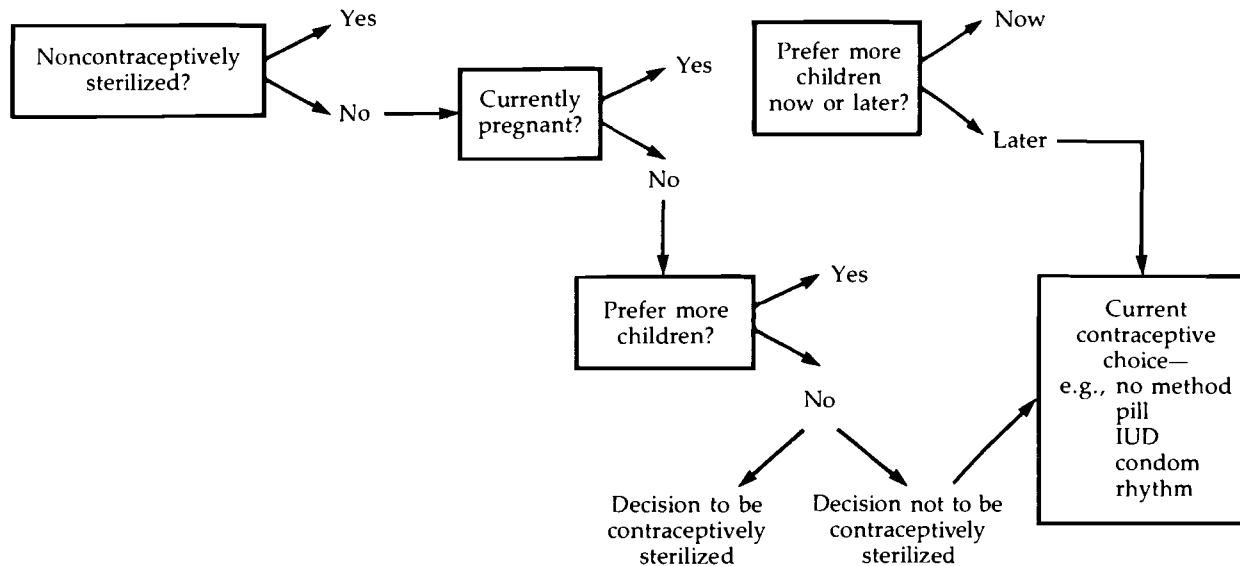


Figure 12.1. Current contraceptive choice: model of the decision-making sequence

costs of contraception are those of a birth out of wedlock, a birth that disrupts an employment or educational timetable, or the life-long commitment of both financial and emotional resources.

Furthermore, contraceptive choice is extremely varied. If the pill were the only method of contraception available, then one could imagine some couples deciding to have an additional child rather than risk possible complications of pill use. But there are multiple choices, and a woman concerned about the adverse consequences of pill use may decide to use another available method.

These arguments suggest that there is no structural reason why fertility intentions cannot be treated as a straightforward exogenous variable. Since the effect of a timing failure is likely to be less severe than the effect of a number failure, one would expect those who intend to have no more children to be more likely than those wishing to postpone births to use contraception and to use the most effective methods. Yet it is also likely that if any important variables are omitted from the contraceptive choice equations, those variables would be important predictors of fertility intentions. In this circumstance the inclusion of fertility intentions as a predictor variable in the contraceptive choice equation would result in correlated error terms, and hence biased and inconsistent estimates.

Furthermore, some couples may intend to have a child (or another child) and, as a result, decide not to use contraception. Several years may go by without their experiencing a conception. With the passage of time they may, for various reasons, decide they do not want a child after all, and they may also decide that they have no reason to start using a method now. At the time of an interview these couples would be classified as intending to have no more children and not using a contraceptive method, but their current nonuse would be the result of their earlier intentions rather than of their current intentions. For all the reasons discussed above, the multivariate empirical work reported here does not include fertility intentions and thus the models estimated should be considered as reduced form equations.¹

Sterilization is the most popular form of contraceptive protection in the United States today, and therefore an understanding of the sterilization decision is critical to our general understanding of contraceptive choice. At present, sterilization has to be considered irreversible. Hence, once it takes place, replacing it with a different contraceptive method is not a realistic

1. Despite the persuasiveness of this theoretical argument, we did empirically explore the idea of including intentions in our multivariate analysis. In an almost classic textbook fashion, the intentions results were strongly dependent on the model specifications. Not only did the size of the intentions coefficients change, but also the signs changed as specification changes were introduced and various subsamples analyzed. Fortunately, the coefficients on all the socioeconomic and demographic variables were very robust across model specifications and were largely unaffected by the presence or absence of the intentions variable.

option (except for a nonsterilized individual who separates from his or her sterilized sex partner). Because the sterilized do not face a current decision about contraceptive choice, the contraceptive sterilization choice must be treated as a decision occurring earlier—perhaps five, ten, or 15 years earlier—than the time of the interview. For that reason, it would be inappropriate to use current status variables to model the decision. These considerations have led us to exclude contraceptively sterile individuals and couples from our model. The analysis of the determinants of sterilization requires a different strategy and set of sample restrictions from those used here (Bumpass 1987); thus, results from the two types of analysis are not directly comparable. Because the exclusion of sterilized persons is likely to influence our findings about the determinants of current contraceptive choice, we nevertheless attempt where possible to juxtapose them with results from multivariate models of the determinants of contraceptive sterilization.

A woman or man who has had a noncontraceptive sterilization operation also is not at risk of making a current contraceptive choice and is excluded from our analysis of current choices. The determinants of noncontraceptive sterilization, and its ambiguous relationship to contraceptive sterilization, are discussed elsewhere (Rindfuss and Liao 1989).

For the other categories of current contraceptive use or nonuse, it is appropriate to assume that choices are made around the time of the interview. None of the other methods is irreversible. Although stopping use of the intrauterine device (IUD) normally requires gynecological assistance, women do routinely evaluate the decision to continue using it. Such evaluation is even more deliberate with other methods dependent upon user initiative, such as the pill, the condom, rhythm, and withdrawal. This is not meant to imply that habit does not play a role in continued use (see Camic 1986). We expect that, once individuals choose a contraceptive method, they habitually use that method until they have a reason to change. But just because they continue to use a method does not mean that they are not making a decision to do so.

Furthermore, we assume that the method choice itself is such that nonuse is always an alternative. For whatever reason (cost, availability of abortion, or suspicion of low fecundity), a couple may decide not to use a contraceptive method.

Like those who are sterilized, those who are pregnant or attempting to get pregnant do not face the current contraceptive choice decision. The reasons are self-evident, but again it is important to remember that the same variables we examine with respect to current contraceptive choice also influence pregnancy status. Thus, in interpreting our results for current contraceptive choice it will be important to consider the sample selection as well as the more direct effects of the various predictor variables.

The framework guiding our research is the general social-demographic model that has emerged in recent years. Figure 12.2 displays the categories of factors that we examine, as well as the specific variables within those categories. Both background factors and current characteristics are important because they define the social and cultural conditions and constraints faced by those making a contraceptive choice. For example, education sorts individuals into different career trajectories, and it is related to an individual's willingness to change and innovate. Thus, one might have expected the better-educated to be the first to adopt the pill after it was introduced (Ryder 1972) and the first to discontinue its use in the face of adverse health warnings. Catholic education adds the additional dimension of Catholic Church teaching regarding contraceptive use. Although the planning status of previous births is not a traditional background variable, we include it here because we assume that the cumulative experience of planning failure motivates individuals to use more effective methods.

Missing from the background factors shown in Figure 12.2 are race and ethnicity. The literature on contraceptive use contains many suggestions that the entire structure of contraceptive choice determinants differs among racial and ethnic groups. For this reason we have decided to limit our present analysis to the white, non-Hispanic U.S. population.²

The current characteristics reflect a variety of constraint and opportunity considerations. For example, one would expect the cost of an unintended pregnancy to be higher if the woman is working full time than if she is a homemaker and thus that the full-time worker would be more likely to be using the most effective methods. Region represents aggregate constraints that may exist. Medical practices vary from region to region. For example, medical conventions tend to be statewide or regional rather than national. Similarly, the provision of family planning services through public or voluntary agencies may differ from state to state.

Marital status represents a different type of current characteristic. On the one hand, the cost of a contraceptive failure (or a nonuse failure) is presumably higher for the unmarried woman than for the married woman. But one may expect coital frequency, and hence the perceived need for effective contraception, to be lower for those who are not currently married. Further, an unmarried woman may be less likely to use coitally related methods because of the cooperation those methods require between sex partners. Contraceptive use patterns immediately after marital dissolution are consistent with this reasoning (Bumpass and Rindfuss 1984). Here we

2. We have examined black contraceptive decision making in a separate analysis (Stephen et al. 1988). Unfortunately, there are not enough Hispanics in any of the various national data sets to allow a separate analysis of them.

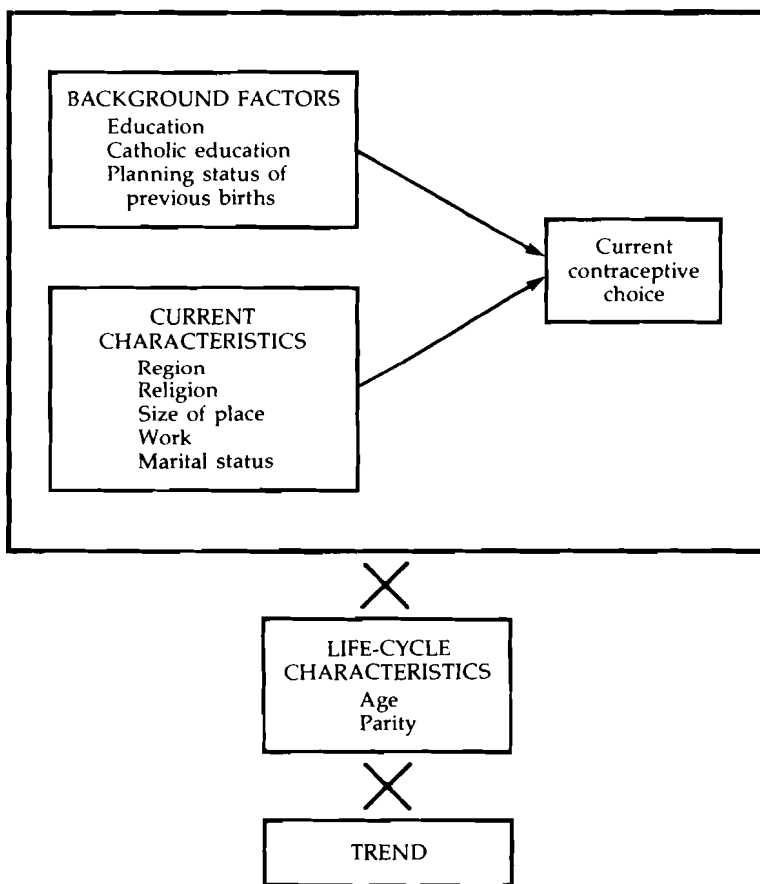


Figure 12.2. A sociodemographic model of contraceptive choice
Note: x signifies an interaction.

examine the broader cross-sectional relationship between marital status and contraceptive protection.

In addition to background and current factors, a set of life-cycle characteristics exists that we expect not only to have a direct effect on current contraceptive choice, but also perhaps to interact with other factors in the model. As age and parity increase, one would expect women to switch to the most effective methods. Given the health concerns about older women (particularly smokers) who use the pill, one would expect its use to decrease with age.

The final variable in the model is period or trend. The rapid change in contraceptive technology in the past 25 years is well known and quite remarkable. The pill was first marketed in 1960. The modern plastic and stainless steel IUDs became available in the mid 1960s. Since then there has been a steady stream of IUD refinements involving their size, shape, and material; for example, some newer IUDs are medicated. There have also been periodic and well-publicized concerns about the safety of some contraceptive methods. Given the changes in contraceptive technology and periodic public alarm, we expect trend to have an important effect on the determinants of current contraceptive use, and hence we allow it to have both additive and interactive effects.

DATA AND METHODS

The analysis is based on Cycles II and III of the National Surveys of Family Growth (NSFG), which were conducted in 1976 and 1982, respectively (Grady 1981; Bachrach et al. 1985). They are the most recent in a long series of fertility studies conducted in the United States since the 1955 Growth of the American Families Study and are generally acknowledged to be of high quality. Several studies have found remarkably high consistency between the 1976 study and earlier ones (Swicegood et al. 1984; Myers et al. 1985). Since Cycle III data were only recently released, a cumulated set of comparisons between it and previous studies does not exist; nevertheless, we expect it to be of the same high quality as the earlier data sets because of similarities in design and personnel.

Both of the NSFG cycles sampled women of ages 15–44 and interviewed a similar number of respondents (8,611 in 1976 and 7,969 in 1982). But substantial differences in eligibility criteria between the two cycles affect our analysis. The 1976 NSFG was primarily a sample of ever-married women. Only a small number (641) of never-married mothers was included. The 1982 NSFG, for the first time, used a sample of all women 15–44, including those who had never married or given birth. Furthermore, unlike the earlier NSFG, it oversampled teenagers and included a supplemental sample of women living in college dormitories and sororities. Because the overall sam-

ple size was not increased (in fact, it was a little smaller), the number of ever-married women in Cycle III was only about half the number in Cycle II. Given the complex models that we estimate, this reduction in sample size is unfortunate. In several instances, substantively meaningful trend interactions are not statistically significant, whereas it appears that they would be with a larger sample size. We therefore need to be cautious in interpreting both the changes and the absence of changes that we report.

Because the contraceptive choice decision involves a categorical variable with multiple choices, our multivariate work uses polytomous logit regression as the estimation technique (Pindyck and Rubinfeld 1981; Maddala 1983). We experimented with fitting a wide variety of models in accordance with the expectations outlined earlier. For parsimony, we present here only the results of our final, or "best," model without going through each step of the model-fitting process. Where appropriate, we refer to some of the earlier models that were tested.

The results are shown in two ways. First, we show the actual betas from the polytomous logit regression. These coefficients represent reductions or increases (depending on the sign) in the log odds of being in the first category rather than the second. For the predictor variables that are categorical (all but age), the coefficients should be interpreted in relation to the reference category. It may be helpful to remember that coefficients of 1.0 and 0.5 represent respective increases of approximately 2.7 and 1.8 times the probability of being in the first versus the second category. Second, we show the results by evaluating the polytomous logit regression equation for various combinations of the independent variables to obtain the estimated probability of their being in each of the categories of the dependent variable. We present these probabilities as percentages. The results can be thought of as expected percentages when the other variables in the model are held constant at their mean levels. We do this to facilitate interpretation of the logit regression betas.

FINDINGS

Current-Use Distributions

Before turning to our multivariate analysis, we examine the distribution of white, non-Hispanic women by contraceptive status (Table 12.1). It can be seen that considerable change occurred over the six-year period between Cycle II and Cycle III of the NSFG. (This distribution is weighted, but it is not adjusted multivariately for any of the variables that will be included in the subsequent analysis.) Contraceptive sterilization became substantially more popular. By 1982, more than one-quarter of the sample couples had been contraceptively sterilized. Most of the increase in contraceptive ster-

Table 12.1. Percentage distribution of white, ever-married women, by current contraceptive status: United States, National Surveys of Family Growth, 1976 and 1982

Status	1976	1982
Using contraceptive sterilization		
Female sterilization	10	17
Male sterilization	10	11
Using noncoital methods		
Pill	23	14
IUD	6	4
Using coital methods		
Diaphragm	3	5
Condom	8	9
All others	8	7
Pregnant	5	5
Seeking pregnancy	5	5
Noncontraceptively sterilized (self or partner)		
Female sterilization	8	10
Male sterilization	1	1
In other nonuser category	12	11
Total ^a	100	100
Unweighted N	5,010	2,722

^aPercentages do not sum exactly to 100 because of rounding.

ilization was the result of increased female contraceptive sterilization.³ Correspondingly, the proportions using the pill and the IUD dropped substantially. Although part of this change represents movement of couples into the contraceptively sterilized category, there was also a modest increase in the proportions using the less effective, coitally related methods.

Overall, there was little decrease in the proportion not using contraception (31 versus 32 percent), partly as a result of the stability of the proportion pregnant or seeking pregnancy during the period between the two cycles. And in both years, a substantial proportion of respondents reported sterilizations performed for noncontraceptive reasons.

3. It should be borne in mind, however, that an ever-married female sample such as this is inappropriate for examining relative increases in male and female sterilization. When currently married women are analyzed (Bumpass 1985), the proportionate increases in male and female sterilizations are more nearly equal. If we had an ever-married male sample, we might see a disproportionate increase in male sterilizations.

Interpretation of the category of other nonusers requires caution. On the face of it, the behavior of these people appears to be irrational with respect to fertility control. They were not contracepting in spite of not wanting to become pregnant at the time of the interview. But many may have had valid reasons for not using contraception. Some, including those whose husbands were ill or temporarily absent, may not have been having sexual intercourse. Others may have tried earlier to get pregnant and, failing to do so, concluded they could not. For some of these women, abortion may have represented a preferable alternative to contraceptive use.

As we examine the determinants of current contraceptive use, it is important to note that the proportion of couples who had been sterilized, were pregnant, or were seeking pregnancy—and who, therefore, are excluded from this analysis—increased substantially from 1976 to 1982 because of increases in sterilization (see Table 12.1). This increase in sterilization needs to be kept in mind when considering the changes in our results over time.

Current Contraceptive Choice

We examined three categories of current contraceptive status. The first included users of the two effective and noncoital methods, the pill and the IUD. As we have seen from Table 12.1, the majority of respondents in this group were pill users. The second category included users of the less effective and coitus-related methods. This was a diverse group, with condom users outnumbering the others by 1982. The effectiveness of all the methods used by this group depends heavily on the motivation of the user. The third group consisted of nonusers.

We avoided having each contraceptive method be a category for our dependent variable because most of the categories would have been too small for reliable estimates. We did, however, experiment with two other groupings of the dependent variable: users of physician-administered methods (the pill, IUD, and diaphragm), users of other methods, and nonusers; and male users, female users, and nonusers. With minor exceptions, the results from these alternative groupings were quite similar to those for the coital-noncoital distinction, but the coital-noncoital results were marginally stronger. This finding suggests that the big distinction is between pill and IUD use and use of other methods.

In preliminary analyses we pooled the two data sets, for 1976 and 1982, and tested for potential interactions with both trend and life-cycle variables (see Figure 12.2). For the life-cycle variables, we found that the effect of marital status interacted with parity in the same way in both 1976 and 1982. The effect of marital status on method choice was substantially different for zero-parity women than for women who had borne at least one child. Surprisingly, there were no other interactions with life-cycle variables. However, there were several significant trend interactions, making it desira-

ble to consider the results separately for the two years. The significant trend interactions are noted in the discussion of the results.

The planning status of previous births consistently had no effect on contraceptive choice and for that reason was excluded from the final models. We had expected that the experience of a previous timing or number failure would lead couples to use more effective methods. There are two possible reasons why we did not find this. The first is that women who were not using (or could not use) the pill or IUD may have been less likely than others to have used it in the past, and for that reason may have had a history of family planning failures. The second is that a history of timing failures increases the likelihood of sterilization (Bumpass 1987) and thus selects out the more motivated of this population.

We also excluded Catholic education from the final model. We had expected that having received some or all of one's education in a Catholic school would increase the salience of the Catholic position on contraception. After we controlled for religion and religiosity, however, Catholic education had no effect.

Finally, we had expected the effect of age on method choice to be curvilinear. But we could not find such a curvilinear effect despite two separate investigations, one categorizing age and the other treating age as an interval variable and including higher-order terms.

Table 12.2 shows the betas from two separate logit regressions (1976 and 1982). It should be borne in mind that the smaller sample size for 1982 (less than half that of 1976) means that the 1982 coefficients have larger standard errors. The beta coefficients represent the log odds of being in one category relative to another specified category. Since many readers are not familiar with interpreting logit regression results, we present most of our findings in terms of predicted probabilities (Tables 12.3 to 12.8).

To what extent is the shift in the distribution of current-use status observed in Table 12.1 a result of changing sociodemographic characteristics of the population? To examine this question, we evaluated the 1976 equation twice, once using the means from the 1976 sample and then using the means from the 1982 sample. If the trend were due to a distributional change, then we should have been able to replicate it in this exercise. We also repeated the procedure using the 1982 equation. The results, shown in Table 12.3, are the same regardless of whether the 1976 or the 1982 model is used: the overall change in current method use observed between 1976 and 1982 was not due to distributional changes. This finding suggests that the change was due to independent period effects or changes in the structure governing contraceptive choice. Either type of effect might be associated with the changes in selectivity due to movement to sterilization. The changing structure is clearly part of the explanation, however. Further, experimenting with pooling data from the two years, we find evidence of an

Table 12.2. Polytomous logit results (betas) for contraceptive choice: United States, National Surveys of Family Growth, 1976 and 1982

Predictor variable ^a	1976			1982		
	Pill/IUD vs. nonuse	Other method vs. nonuse	Pill/IUD vs. other method	Pill/IUD vs. nonuse	Other method vs. nonuse	Pill/IUD vs. other method
Age	-.13†	-.03†	-.10†	-.14†	-.07†	-.0†
Region (South)						
North	-.34*	.08	-.42†	-.17	.28	-.45*
Midwest	-.07	-.11	.04	-.09	-.11	.02
West	.26	.12	.14	-.27	-.20	-.07
Education, in years (high school graduate)						
0-8	-.94†	-.79†	-.15	-1.13*	-.61	-.52
9-11	-.17	-.49†	.32*	-.52*	-.52	.01
13-16	.29	.49†	-.20	.16	.65†	-.49†
16+	.75†	.75†	.00	.51*	1.06†	-.55†
Metropolitan residence (rural)	-.03	-.07	.04	-.52*	-.31	-.21
Religion (active Protestant)						
Passive Protestant	.27	-.07	.34†	.90†	.38	.52†
Passive Catholic	.09	.12	-.02	.73†	.68*	.05
Active Catholic	-.40	-.03	-.36	-.08	.57	-.67*
Fundamentalist	-.10	.27	-.37	.09	-.25	.34
Other or none	-.07	-.01	-.07	.78*	.55	.22
Marital status (currently married)						
Formerly married	-1.00†	-2.47†	1.47†	-1.37†	-2.76†	1.40†
Parity						
0	-1.68†	-1.33†	-.37†	-.89†	-1.26†	.37
1	-.64†	-.52†	-.12	-.40	-.58†	.18
3+	.02	-.01	.04	.41	.42	-.02
Formerly married by 0 parity interaction	.31	1.34†	-1.03†	.61	1.54†	-.92
Work (homemaker)						
Full-time	.61†	.12	.49†	.80†	.54†	.26
Part-time	.57†	.47*	.10	.23	.56*	-.33
Other	.30	.03	.27	-.05	-.29	.24
Model chi-square	721.8			446.6		
N	2,957			1,367		

†p < .01. *p < .05.

^aReference category is given in parentheses.

Table 12.3. Percentage distribution of current contraceptive use, by method: United States, National Surveys of Family Growth, 1976 and 1982

Method	Distribution	
	Using 1976 means	Using 1982 means
1976		
Pill or IUD	51	52
Other methods	30	29
No method	19	19
Total	100	100
1982		
Pill or IUD	41	40
Other methods	42	42
No method	17	18
Total	100	100

independent period effect. Although we cannot separate these effects into components involved or not involved with selectivity, we expect that movement away from the pill and the IUD reflects concerns about their safety that were raised during the period.

Turning to the effects of the various social and demographic variables shown in Table 12.2, we find, as expected, a negative relationship between age and pill and IUD use. Table 12.4, which shows the predicted method distribution for five ages, holding all the other variables constant at their mean, indicates a dramatic decline with age for both years in the proportion of women using the pill or IUD. This decline undoubtedly resulted from a combination of movement to sterilization, movement to less effective methods among older women as both fecundity and coital frequency decreased, and "successful" experimentation with nonuse. The age profile of nonusers was virtually identical in both years. At ages 30 and under, where selectivity associated with sterilization is less likely to play a large role in method choice, the declines in the probabilities of pill or IUD use were mirrored by sharp increases in the likelihood of other method use.

Regional differences were primarily between the north and the rest of the country. In 1976 and to a lesser extent in 1982, northern women were less likely than others to use the pill or IUD and more likely to use coitally related methods. This difference between the two years was statistically significant, suggesting that the differential had been weakening. The northern region is the most Catholic, suggesting that religion may be part of the explanation. Since this difference persisted even when we controlled for the individual woman's religion, it may be that the Catholic proscription

Table 12.4. Percentage distribution of current contraceptive use, by age of women and method: United States, National Surveys of Family Growth, 1976 and 1982

Method	Age				
	20	25	30	35	40
1976					
Pill or IUD	76	64	51	37	24
Other methods	16	23	30	36	41
No method	8	13	19	27	35
Total	100	100	100	100	100
1982					
Pill or IUD	62	51	39	28	19
Other methods	31	37	42	44	43
No method	7	12	19	28	38
Total	100	100	100	100	100

Note: All other variables are set at mean levels.

against birth control methods other than rhythm or abstinence also affects the providers of family planning services—public and private—so that they are less likely to prescribe the pill or IUD. It is also possible that having more coreligionists nearby affects all residents of a region. For example, Catholic parishes may be bigger and more active in the north, and this in turn may influence media presentations. These regional findings are mirrored in the relative unpopularity of sterilization procedures in the north (Bumpass 1987). The four regions examined here are quite heterogeneous, however, and it is quite possible that significant subregional differences exist that we cannot examine with these data sets.

The effects of education are somewhat more complex, and their interpretation is aided by the predicted distributions shown in Table 12.5. Caution is advised in interpreting the deviation of the 0–8 year group as an “education effect.” Given the mandatory education laws in the United States, women in the 0–8 year category constituted a heterogeneous group, including some individuals who were institutionalized and some who had received their education abroad. We have treated them as a separate group because they did not belong in the high school drop-out group.

For the remaining educational groups, in neither year were there strong differences in the proportions using the pill or IUD. In general, one would expect the better-educated to use the more efficient methods. This tended to be the case for the 1976 data but not for 1982. We know that educated women can use the less effective methods successfully (Schirm et al. 1982). It also appears that, in recent years, better-educated women (or their husbands) have increasingly chosen contraceptive sterilization (Bumpass 1985),

Table 12.5. Percentage distribution of current contraceptive use, by education of women and method: United States, National Surveys of Family Growth, 1976 and 1982

Method	Years of education				
	0-8	9-11	12	13-15	16 +
1976					
Pill or IUD	37	52	50	49	56
Other methods	25	22	30	35	33
No method	38	25	20	15	11
Total	100	100	100	100	100
1982					
Pill or IUD	26	39	44	37	37
Other method	36	31	36	49	52
No method	38	30	20	15	10
Total	100	100	100	101	100

Note: All other variables are set at mean levels. Percentages may not sum exactly to 100 because of rounding.

and therefore these better-educated women are not in the universe examined here. In short, the education effect may have occurred earlier in the decision-making chain. This lack of an education effect on method choice may also be the result of a tradeoff between concerns about method effectiveness and concerns about adverse side effects. The biggest difference among the education categories was between the proportion using other methods and the proportion using no method. The proportion using no method declined steadily and sharply with increased education. Although it is tempting to talk about the "irrationality" of those with less education, we suspect that if it is part of the explanation, it is only a small part. Rather, women with less education start having children at younger ages, want more children, and are less likely to want no children. The less educated woman therefore should know more about her fecundity at an earlier age and be able to use this knowledge in making her contraceptive decision. Unfortunately, we do not have a good measure of perceived fecundability for testing this hypothesis.

The religious differences are interesting and may shed light on the Catholic fertility debate. We combined religious affiliation with a measure of religiosity for both Catholics and Protestants. Active Protestants were those who reported going to religious services at least once a week; all other Protestants we classified as passive. Active Catholics were those who reported receiving communion at least once a week. Our definition of an active Catholic was somewhat more conservative than our definition of an active Protestant, in that passive Catholics could go to religious services at least

Table 12.6. Percentage distribution of current contraceptive use, by religion of women and method: United States, National Surveys of Family Growth, 1976 and 1982

Method	Protestant (nonfunda- mentalists)		Catholic		Funda- mentalists	Other
	Active	Passive	Active	Passive		
1976						
Pill or IUD	49	57	40	49	42	47
Other methods	31	26	36	32	39	32
No method	20	18	24	19	19	21
Total	100	100	100	100	100	100
1982						
Pill or IUD	33	49	23	39	38	43
Other methods	41	36	57	46	34	42
No method	26	15	20	15	27	15
Total	100	100	100	100	100	100

Note: All other variables are set to mean levels. Percentages may not sum exactly to 100 because of rounding.

once a week without receiving communion. Given the increased visibility and strong pro-life views of Protestant fundamentalist sects, we treated them as a separate category.⁴ A residual group included persons with no religion and those affiliated with religions that are geographically clustered and thus difficult to represent in a national sample. We have not attempted to interpret the results for this residual and heterogeneous group.

The NSFG data revealed substantial differences in contraceptive use between active and passive adherents of the Catholic and Protestant religions (Table 12.6). Those who were active were less likely to use the pill or IUD and more likely to use other methods or no methods. Catholics (whether active or passive) were more likely than Protestants to use other methods, including rhythm. These differences were somewhat greater in 1982 than in 1976, as one would expect from the recent emphasis in both the Catholic and Protestant religions on familistic issues, and from the Catholic Church's affirmation of its proscription against birth control. Formal tests of a religion by trend interaction were statistically insignificant. Nevertheless, the direc-

4. The following are considered fundamentalist: Adventist, Apostolic (except Reformed Zion Union or Armenian), Bible, Free, Fundamental, Gospel, Holiness, Jehovah's Witness, Mission, Missionary, Nazarene, Church of God or Church of Living God (except Mennonite), Pentecostal, Sanctified. Unfortunately, some of the more fundamentalist-oriented members of the Baptist denomination could not be separately identified.

tion of the differences over time were substantively appealing and might have been significant with a larger sample.

The large difference between the active and passive traditional religious groups suggests that the debate over the end of "Catholic fertility" (Westoff and Jones 1977; Jones and Westoff 1979; Mosher and Hendershot 1984; Mosher and Goldscheider 1984) needs to be clarified. We found essentially no difference in nonuse levels between passive Catholics and Protestants. But active Catholics were the least likely to use the most effective methods and the most likely to use the least effective methods. Nevertheless, more Catholics described themselves as passive than active (the ratio was between 2:1 and 3:1), and the passive Catholics were very similar in contraceptive use to active Protestants. These results suggest a continuum of behavioral differences rather than a simple dichotomy.

Among fundamentalist groups, we found substantial changes over time, although they were not statistically significant. In 1976 the active Catholics and the fundamentalists had similar use patterns. By 1982, however, the fundamentalists were more similar to the active Protestants. Of particular interest was the apparent increase in nonuse among fundamentalists. The estimates were subject to a high sampling error, however, because the fundamentalists constituted such a small proportion of the sample (5 percent).

We found the effect of marital status on contraceptive use to vary, depending on parity. We therefore considered the effects of parity and marital status jointly (Table 12.7). As reported earlier (Bumpass and Rindfuss 1984), the effect of marital status was significant but not dominant. In general, currently married women were more likely than women no longer married to use coitally related methods and less likely not to use any method. The difference in nonuse levels was probably due to differences in the two groups' exposure to risk of pregnancy; and the difference in levels of coital-method use probably reflected more difficulty in communication and cooperation with their sexual partners among those not currently married. The differences between currently and previously married groups was much smaller among the childless, however. It is tempting to speculate that zero-parity women do not appreciate the negative consequences of childbearing as much as women who have had children, but another plausible explanation is that women not currently married are more likely to be sexually active if they do not have children.

In general, parity was positively associated with pill and IUD use. This association was weaker in 1982 than in 1976, though, and the difference was statistically significant. The lower proportions of pill and IUD users among higher-parity women in 1982 was probably associated with the increased prevalence of sterilization, which has long been associated with parity. By 1982 the pronounced differences between zero parity and higher-parity pill and IUD users had disappeared. As expected, nonuse of contraception declined with parity.

Table 12.7. Percentage distribution of current contraceptive use, by parity and marital status of women and method: United States, National Surveys of Family Growth, 1976 and 1982

Method	Parity			
	0	1	2	3+
1976				
Formerly married women				
Pill or IUD	27	46	60	60
Other methods	16	7	9	8
No method	57	46	32	31
Total	100	100	100	100
Currently married women				
Pill or IUD	34	48	55	56
Other methods	30	34	34	33
No method	36	18	11	11
Total	100	100	100	100
1982				
Formerly married women				
Pill or IUD	33	35	42	49
Other methods	21	11	15	18
No method	46	54	43	33
Total	100	100	100	100
Currently married women				
Pill or IUD	38	38	37	38
Other methods	38	47	53	56
No method	24	15	10	7
Total	100	100	100	100

Note: All other variables are set at mean levels. Percentages may not sum exactly to 100 because of rounding.

The final variable we examined was respondents' employment status at the time of the interviews. As expected, full-time workers were more likely than homemakers to be using contraception, and to be using the most effective methods (Table 12.8). This was also the case for part-time workers in 1976.

CONCLUSION

Although the overall structure of the determinants of contraceptive choice remained fairly stable between 1976 and 1982, there were several important changes. Regional differences diminished as did parity differences. There is also some evidence that religious differences were changing. Pill and IUD use declined over the period, and the decline was not due to

Table 12.8. Percentage distribution of current contraceptive use, by employment status of women and method: United States, National Surveys of Family Growth, 1976 and 1982

Method	Employment status			
	Homemaker	Working full-time	Working part-time	Other ^a
1976				
Pill or IUD	45	58	52	52
Other methods	32	26	34	28
No method	23	16	15	20
Total	100	100	100	100
1982				
Pill or IUD	37	47	33	40
Other methods	40	38	50	34
No method	23	13	16	26
Total	100	100	100	100

Note: All other variables are set at mean levels. Percentages may not sum exactly to 100 because of rounding.

^aCategory includes those on vacation, sick leave, or looking for work.

changes in the distribution of the population. Rather, it was the result of period factors, most likely the adverse publicity given to the medical risks associated with those two methods.

With respect to the socioeconomic variables, in general the results tended to support our expectations regarding risk of unwanted or mistimed fertility. Working and better-educated women were more likely to be using some method than were homemakers and women with less education. Although education had surprisingly little effect on method choice, working women were more likely than others to use the more effective methods. Active Catholics were least likely of all the religious groups to use the most effective methods.

The analysis also revealed life-cycle effects on method use. Nonuse of contraception increased with age (as women's experience with their own fecundity grew) but decreased with parity (as the cost of another child rose). We found corresponding changes in method choice. These life-cycle effects suggest that women (or couples) move in and out of various contraceptive use categories in accordance with their life-cycle stage and past experiences.

This result highlights a crucial limitation of cross-sectional data to our understanding of the socioeconomic determinants of contraceptive method choice. At any given time, only some individuals are making contraceptive decisions. This is clearly the case with those who are sterilized—they have no need to make a current contraceptive choice. But even those who are

making current choices factor in information from prior experiences. We suspect, for example, that individuals accumulate impressions (even if incorrect) of their fecundity, and that these impressions inform their current contraceptive choices. In several cases where we found substantial differences among groups in the proportion of nonusers, the group that would be most likely to know about a fecundity impairment was also the most likely not to be using any method. Thus, we have reached the somewhat paradoxical conclusion that, to understand further the determinants of couples' current contraceptive choices, we need to know more about the determinants of contraceptive choice at younger ages and the transitions they went through in the past.

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13 The Sterilization Decision in a U.S. Sample

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In the United States in 1982, 28 percent of all married women 15-44 years of age were protected by contraceptive sterilization (Bachrach and Mosher 1984:3). Among the 19.2 million married women practicing some form of contraception, 25.6 percent were using tubal ligation and 15.3 percent were relying upon their husbands' vasectomies. Among all married U.S. couples who intend to have no more children, up to 80 percent are protected by female or male sterilization within 25 years of the birth of their last wanted child (Westoff and McCarthy 1979:148).

These developments highlight the enormous and growing popularity of contraceptive sterilization in the United States. Given its popularity and the fact that sterilization must be treated by both consumers and family planning practitioners as an irreversible procedure, a better understanding is needed of why and how couples choose sterilization as their method of contraception. Although numerous investigators have attempted to explain the choice of sterilization, their efforts have been nonsystematic and the results have been inconsistent and modest, especially those utilizing psychosocial factors (Philliber and Philliber 1985:1). In this chapter we present a general model for understanding the choice of sterilization as a contraceptive method and then test the model with data collected from a sample of U.S. women.

THEORETICAL PERSPECTIVE

Contraceptive choice appears to be affected by various factors. One is motivation for childbearing. Card (1979:140) found, for example, that an appreciable amount of variance in the strength of contraceptive practice among 100 white U.S. couples was due to motivation to prevent childbearing, or what she called motivation for fertility control. A second factor is the perceived risk of conception, which Luker (1975:78) identified as important to a woman's decision to practice contraception. Third is the individual's perception and evaluation of the available contraceptive methods. Adler (1979:187) has discussed some of the more important models developed to explain how contraceptive decisions are affected by cognitive and emotional factors. The decision-making process itself, especially the interaction between two contraceptive partners, is another factor that can affect choice. Severy's (1984a)

research has demonstrated the importance of taking into account the contraceptive values of both spouses when predicting future contraceptive use. Fifth and finally, both the community and the larger society can have an important bearing on contraceptive choice. For example, Clark et al. (1979:250) and Clark and Swicegood (1982:341) found that external sources of information and such persons as family members, friends, and physicians were important determinants in the choice of sterilization.

We have attempted to organize all of these factors into a general model of sterilization choice having three primary components. The first component is based upon the observations of Mumford (1983:83), who described a process of sequential decision making that unfolds over time among men who select vasectomy. The process begins with the decision to terminate childbearing, proceeds to the decision to abandon temporary contraceptive methods in favor of sterilization, and concludes with the decision to select either vasectomy for the man himself or tubal ligation for his partner. In our model we assume that these three decisions—that is, the termination, sterilization, and method decisions—are linked causally in the temporal order just described. We have already demonstrated considerable support for this assumption in an analysis of the determinants of sterilization method choice (Miller et al. 1985–86).

This chapter and another study dealing with ambivalence about the termination decision (Miller and Shain 1985) also provide support for the second component of our general model, which has less to do with the overall sequence of decision making than with the specific determinants of each decision. We assume that each decision is affected by three types of factors—namely, substantive factors such as motivations toward childbearing and contraceptive attitudes and beliefs, processual (process-related) factors such as partners' interaction while making the sterilization method decision, and situational factors such as peer influence on desired family size or the availability of specific contraceptive methods in the couple's community.

The third component of our model is based on an idea that has been in the research literature for a long time (Fawcett 1970), namely, that demographic effects on fertility are mediated through individual and couple-level phenomena. Thus, we assume that demographic antecedents to the choice of sterilization act indirectly through the substantive, processual, and situational factors already described.

STUDY DESIGN AND DATA COLLECTION

Our data were collected as part of a prospective, controlled study designed to examine the long-term physical and psychosocial consequences of tubal ligation. The study sample was composed of three groups of non-Hispanic, Caucasian women 18–49 years of age. One group consisted of women sched-

uled for tubal ligation (the tubal ligation group). A second group consisted of women whose husbands were scheduled for vasectomy (the vasectomy group). A third group consisted of women who had completed their desired childbearing but did not plan on sterilization within the next 12 months (the not-planning-sterilization group).

These three groups were recruited from the patient populations of approximately 50 obstetric-gynecology and urology offices and clinics serving all social classes in San Antonio, Texas. Women in the tubal ligation group were recruited through a letter, given to them in their physicians' offices, that explained the study. Recipients of the letter were invited to return it with their names and telephone numbers if they agreed to be contacted. The same recruitment procedure was followed in urology offices: women accompanying their husbands for preoperative vasectomy counseling or inquiries were given a recruitment letter. A separate letter was available for men who were not accompanied by their wives. Trained interviewers telephoned those expressing interest, offering additional information about the study and scheduling an interview. Women from the tubal ligation and vasectomy groups who reported that sterilization was being performed solely for medical or obstetrical indications were excluded from the study.

To recruit the group of women not planning sterilization, a two-page form was used; the first page instructed women to proceed to the second page, the recruitment letter, only if they had completed their desired childbearing and did not plan on sterilization, at least within the following 12 months. The form was distributed by physicians or office personnel to appropriate patients. Prospective subjects were then screened by telephone for eligibility. In addition, on randomly selected days and in waiting rooms of randomly selected physicians' offices and clinics, research assistants recruited eligible subjects. Several physicians agreed to an additional procedure, a record search. Their own personnel searched patient files according to an alphabetic listing determined by random selection, telephoned women whose files suggested they would be suitable for the not-planning-sterilization group, ascertained whether they actually were, and requested permission from those who were to release their names and telephone numbers to us. Lastly, approximately 20 women were referred to the study by participating friends. Post hoc statistical analyses demonstrated that the different recruitment methods did not result in different sample characteristics. Fewer than 11 percent of the women contacted for recruitment into the study refused to participate.

Data were collected during the 16-month period between December 1980 and March 1982. The tubal ligation and vasectomy women were interviewed before surgery. The women not planning sterilization were interviewed at a randomly assigned time. Most interviews were conducted in the wom-

en's homes, although some were conducted at other locations of the women's choosing. Follow-up interviews occurred at yearly intervals on or close to the anniversary of the first interview date. No husbands were interviewed, and all data concerning them were based on wives' perceptions.

To check the reliability of responses, 35 women (5 percent of the sample) were chosen to be reinterviewed. Between several days and one month after their first interview, they were asked to answer again randomly selected questions from the first interview, about topics ranging from their sociodemographic characteristics to their basic attitudes. Of the 350 repeat responses obtained, only 13 (or 4 percent) differed from the original. The differences were minor and not strongly associated with any particular interview items or types of question.

At the conclusion of the first year of data collection, 623 married and 105 unmarried women had been interviewed. In this chapter we consider only the married women. Of these, 255 were tubal ligation women, 167 were vasectomy women, and 201 were not planning sterilization. Missing data for some women compelled us to reduce the size of these groups to 253, 166, and 200, respectively. Throughout the remainder of this chapter, the terms "women" and "men" and "wives" and "husbands" refer to these 619 married women and their spouses.

DATA ANALYSIS

For the analyses reported in this chapter, we combined the tubal ligation and the vasectomy women into a planning-sterilization group for comparison with the not-planning-sterilization group of women. This enabled us to focus our analysis on predicting the decision to have a sterilization. For this purpose we selected seven types of predictor variables on the basis of the theoretical perspective and the general model already discussed: variables related to women's sociodemographic characteristics, childbearing history, current psychological status, contraceptive history, decision to terminate childbearing, sterilization decision, and sterilization method decision. Data on respondents' reasons (or their perceptions of their husbands' reasons) for wanting or not wanting a tubal ligation or vasectomy were limited to too few respondents to permit the creation of valid variables; as a result, only a small number of variables for the sterilization method decision could be used. Altogether, 122 variables were selected (Exhibit 13.1). We examined all of them with an analysis of variance or, in the case of noncontinuous, categorical variables, with chi-square analysis, for their association with the dependent variable (coded 1 = not planning sterilization, or 2 = planning sterilization). Thirty-seven of them had a statistically significant association with the planning-sterilization variable. To keep the analysis more manageable, we selected only the 21 variables of that group that were significant at $p < .001$ for inclusion in the model.

Exhibit 13.1. 122 variables used to analyze the sterilization decision, by type

Sociodemographic variables

†Age
 †Education
 Work status
 *Socioeconomic status
 Income
 Religion
 †Husband's age
 †Husband's education
 †Husband's socioeconomic status
 †Husband's income
 *Combined income

Childbearing variables

†Currently pregnant
 Parity
 Number of planned births
 Number of unplanned births
 Number of accidental births
 *Most recent pregnancy planned
 Ideal family size
 Wants fewer children
 Ever had induced abortion
 Would have abortion for unwanted pregnancy
 Perception of own fecundity
 Perception of husband's fecundity

Current psychological status variables

Personal happiness
 Self-confidence
 Satisfied with femininity
 Amount of conflict with husband
 How certain of marital stability
 Satisfied with sexual relations
 Sexual desire
 Frequency of sexual intercourse
 Which spouse desires sex more
 Who takes sexual initiative
 Satisfied with role as mother
 How much conflict with children
 †Interest in having another baby
 *Physical health
 *Religious involvement
 Satisfaction with employment
 Desire to be employed

Trait anxiety

Psychosomatic concern

Contraceptive history variables

Current method: pill
 †Current method: IUD
 Current method: diaphragm
 Current method: condom
 Current method: none
 How long used current method
 †Satisfaction with current method
 How many methods discontinued because of dissatisfaction
 Negative feelings: pill
 Husband's negative feelings: pill
 Negative feelings: IUD
 Husband's negative feelings: IUD
 Husband's negative feelings: condom

Termination decision variables

†Certainty of wanting no more children
 †Mixed feelings after the termination decision
 *How long ago decided to have no more children
 Reasons for wanting no more:
 *Getting too old
 *Own health problems
 Cannot afford more
 Family big enough
 *Haven't enough energy
 Changing interests
 Strain on marriage
 Too much work
 Too much emotional strain
 Want to work
 *Husband's health
 *Don't like being pregnant
 Husband's age
 Other children
 Fear of having deformed baby
 Husband wants no more
 World conditions
 Already have boy and girl
 Have number always wanted

Exhibit 13.1. (continued)

†Joint decision about no more children	Loss of femininity
Which spouse took initiative	*Current method acceptable
How many times discussed	Husband opposed
Conflict with husband over decision	*None given
Who wants to terminate more	Which spouse took initiative
Who has more influence	How many times discussed
Social pressure affecting decision	How long considered
Recent experience affecting decision	Conflict with husband over decision
	Who has more influence
	Social pressure affecting decision
	Recent experience affecting decision
	How many friends have had tubal ligation
	% satisfied
	% dissatisfied
	*Perceive sterilization as reducing marital problems
Sterilization decision variables	
Reasons for planning sterilization:	
*Easier	
†Other methods unacceptable	
†Safety	
Permanence	
Effectiveness	
None given	
Reasons for not planning sterilization:	Sterilization method decision variables
†Permanance	†Not willing to have tubal ligation
†Expense	Anxious about surgery
Fear of surgery	†Husband not willing to have vasectomy
†Unnecessary surgery	
*Religious/moral objections	
*Fear of side effects	

* $p < .05$ and $\geq .001$ for association with planning-sterilization variable.

† $p < .001$ for association with planning-sterilization variable.

For the entire sample of married women, 15 of the 21 highly significant variables (excluding five sociodemographic variables and one childbearing history variable, described under group differences in the next section) were distributed in the following manner. Eighteen percent of the women were completely unwilling to have a tubal ligation, and 12 percent were partly unwilling. The corresponding figures for husbands' presumed unwillingness to have a vasectomy were 28 and 20 percent. Thirty-one percent of the women favored sterilization for safety reasons, and 10 percent because other contraceptive methods were unacceptable to them. As for the five reasons volunteered by respondents for not choosing sterilization, 59 percent of the women gave no reason, 23 percent cited the procedure's permanence, 1 percent cited the expense, 4 percent objected to unnecessary surgery, and 2 percent said they were satisfied with their current contraception. About 54 percent of the women were satisfied or very satisfied with their current contraceptive method, 34 percent were dissatisfied or very dis-

satisfied, and the remainder were unsure. Eight percent reported they were currently using an IUD. Four percent reported they had not made a termination decision with their husbands, and 12 percent reported that their decision to terminate childbearing had been only partly a joint decision. Nine percent reported either moderate or great interest in having another child; 18 percent reported slight interest. When asked how certain they were about not wanting another child, 70 percent said they were completely certain, 19 percent were almost certain, 8 percent were mostly certain, and 3 percent were somewhat uncertain or not certain at all. Regarding mixed feelings about the termination decision, 52 percent reported no mixed feelings, 33 percent reported some initial mixed feelings, and 15 percent reported they were still in conflict.

Six hypotheses derived from our general model formed the basis for the structural relationships among the 21 variables we included in the analysis. The hypotheses were, first, that all three types of decision variables would predict choice of sterilization directly; second, that the sterilization decision variables would predict choice of sterilization indirectly through the method decision variables; third, that the termination decision variables would predict choice of sterilization indirectly through the sterilization decision variables; fourth, that the contraceptive history variables would predict choice of sterilization directly; fifth, that the psychological status variables would predict choice of sterilization indirectly through the decision and contraception variables; and sixth, that the sociodemographic variables would predict choice of sterilization indirectly through all the other variables. In addition, we created as many latent variables as possible by combining strongly correlated predictors of sterilization choice when they were from the same variable type and their combination seemed conceptually meaningful.

The preliminary model was tested with a series of LISREL analyses (Joreskog and Sorbom 1984). We assumed that error variances were uncorrelated. After 16 iterations, we judged a satisfactory end point to have been reached as indicated by the following results: all standardized parameter estimates were significant at $p < .05$ or better, the broad measures of goodness of fit were generally acceptable, and examination of the normalized residuals and modification indices¹ suggested no changes to the model that were readily interpretable.

1. Modification indices and normalized residuals are measures provided by LISREL that allow a detailed assessment of a model's fit to the data. A modification index represents the expected decrease in the chi-square goodness-of-fit statistic if a fixed or constrained parameter is relaxed and all other parameters are held fixed at their estimated value. A normalized residual is the residual covariance of any pair of indicators (observed variables) in the model, normalized by their estimated standard deviation for comparison purposes. Both measures are guides to specification errors in the model regarding the two involved indicators.

RESULTS

The analysis revealed distinct sociodemographic differences between the women planning sterilization (either tubal ligation or vasectomy) and those not planning sterilization (Table 13.1). The women not planning sterilization were somewhat older, better educated, and married to older, better-educated husbands. If they were currently employed, they had higher-status jobs and higher incomes. Their husbands also had higher-status jobs and higher incomes. Among the group planning sterilization, a much larger proportion was currently pregnant. This was due to the large number of

Table 13.1. Eleven sociodemographic and two childbearing characteristics of women planning sterilization and women not planning sterilization: San Antonio, 1980-82

Characteristic	Women planning sterilization (<i>N</i> = 419)	Women not planning sterilization (<i>N</i> = 200)	<i>p</i>
Mean age (years)	30.2	32.6	.000
Mean education (years)	13.5	14.9	.000
Work status (% employed)	43.0%	50.0%	NS
Mean socioeconomic status ^a	53.2	60.2	.002
Mean income ^b	\$12,574	\$13,962	NS
Religious affiliation			
Protestant	57.3%	50.0%	NS
Catholic	22.7%	27.5%	NS
Other	20.0%	22.5%	NS
Mean age of husband (years)	32.9	34.7	.001
Mean education of husband (years)	14.3	15.8	.000
Mean socioeconomic status of husband ^a	51.8	61.8	.000
Mean income of husband ^c	\$23,972	\$28,203	.030
Mean combined income	\$29,034	\$34,892	.006
Currently pregnant	25.5%	11.0%	.000
Mean total parity (including current pregnancy)	2.29	2.18	NS

Note: Differences in significance levels are based on analyses of variance (*F* statistic).

NS—not significant.

^aSocioeconomic status is classified according to Duncan's (1961) index for all occupations.

^bData for this row exclude four employed women in the planning group and one in the not-planning group who did not provide information about their own income.

^cData for this row exclude 22 women in the planning group and nine in the not-planning group who did not provide information about their husbands' income.

Table 13.2. The measurement model for the sterilization decision analysis: San Antonio, 1980-82

Latent variable	Indicator (observed variable)	Standardized parameter estimate (SPE)	SPE/ standard error ratio	Multiple R ² for indicator
Termination ambivalence	Certainty about termination decision	1.000	0.0	.528
	Ambivalence about termination decision	.910	11.97	.438
Couple's socio- economic status (SES)	Education	.914	16.62	.533
	Husband's education	1.000	0.0	.640
	Husband's SES, based on Duncan's 1961 index	.922	16.46	.544
Couple's age	Age	1.000	0.0	.960
	Husband's age	.801	20.03	.618

tubal ligation women (42 percent) who were planning to combine sterilization with delivery.

The results of the LISREL analysis are shown in Table 13.2 (the measurement model) and Table 13.3 (the structural equation model). The structural equation model including the causal pathways and the path coefficients (standardized parameter estimates, or SPEs) is illustrated schematically in Figure 13.1. The three latent variables—"couple's age, couple's socioeconomic status, and "termination ambivalence"—are represented by ellipses, and their indicators (observed variables) are omitted from the figure for the sake of simplicity. All the remaining variables are observed variables and are represented by rectangles.

In four areas of the model, contrary to our original assumption, measurement errors might be expected to be correlated because of certain methodological procedures. To deal with them, we freed up specific parameters in the theta epsilon matrix so that specific epsilon variables could correlate. First, we allowed the error term for the variable "against sterilization: no reason given" to be correlated with the error terms for each of the four other "against sterilization" variables. Our rationale was that all five of these variables were derived from the same question about reasons for being opposed to sterilization. Anyone whose score was "yes" on the "no reason given" variable necessarily was scored as a "no" on the other four. The standardized parameter estimates for these associations were $-.273$ (unnecessary surgery), $-.429$ (permanence), $-.094$ (current method acceptable),

Table 13.3. The structural equation model for the sterilization decision analysis: San Antonio, 1980-82

Equation and predictor variable(s)	Dependent variable	Standardized parameter estimate (SPE)	SPE/standard error ratio	Multiple R^2 for dependent variable
Equation 1				.647
Satisfied with current contraceptive method	Planning/not planning sterilization	-.111	4.27	
Current Contraception: IUD		-.100	3.85	
Husband not willing to have vasectomy		-.175	6.73	
Not willing to have tubal ligation		-.122	3.39	
Against sterilization: no reason given		.436	15.03	
Against sterilization: unnecessary surgery		-.198	6.60	
Against sterilization: permanence		-.210	7.24	
Against sterilization: current contraception acceptable		-.111	4.11	
Against sterilization: expense		-.166	6.15	
Currently pregnant		.110	4.07	
For sterilization: safety		.068	2.52	
For sterilization: other contraceptive methods unacceptable		.140	5.38	
Equation 2				.035
Joint decision about no more children	Husband not willing to have vasectomy	-.121	3.03	
Couple's age		.126	3.07	
Equation 3				.303
Against sterilization: no reason given	Not willing to have tubal ligation	-.383	12.77	

Table 13.3. (continued)

Equation and predictor variable(s)	Dependent variable	Standardized parameter estimate (SPE)	SPE/standard error ratio	Multiple R^2 for dependent variable
Against sterilization: unnecessary surgery		.226	6.46	
Against sterilization: permanence		.168	5.09	
For sterilization: safety		-.132	4.00	
Equation 4				.016
Termination ambivalence	For sterilization: safety	-.177	2.81	
Equation 5				.260
Termination ambivalence	Against sterilization: permanence	.707	10.10	
Equation 6				.262
Termination ambivalence	Against sterilization: no reason given	-.622	9.42	
Couple's SES		-.228	5.56	
Equation 7				.035
Couple's SES	Against sterilization: unnecessary surgery	.233	4.31	
Equation 8				.012
Satisfied with current contraceptive method	Against sterilization: current contraception method acceptable	.110	2.82	
Equation 9				.026
Current contraception: IUD	Satisfied with current contraceptive method	.160	4.00	
Equation 10				.042
Couple's SES	Current Contraception: IUD	.253	4.60	

Table 13.3. (*continued*)

Equation and predictor variable(s)	Dependent variable	Standardized parameter estimate (SPE)	SPE/standard error ratio	Multiple R^2 for dependent variable
Equation 11				.041
Couple's age	Currently pregnant	-.203	5.08	
Equation 12				.018
Couple's age	Joint decision about no more children	-.133	3.24	
Equation 13				.373
Couple's SES	Termination ambivalence	.275	5.29	
Joint decision about no more children		-.104	3.35	
Couple's age		-.134	3.53	
Interest in having another child		.383	11.26	
Equation 14				.255
Couple's age	Couple's SES	.406	10.97	

and $-.187$ (expense). Second, using the same rationale, we allowed the error terms for the two "for sterilization" variables to be associated. This produced a standardized parameter estimate of $-.244$. Third, we allowed the error terms for the "currently pregnant" and "not willing to have tubal ligation" variables to be correlated. We did so because of the large proportion of pregnant women in the tubal ligation subgroup (who were, by definition, willing to have a tubal ligation), which created a strong association between those two variables. The standardized parameter estimate for this association was $-.148$. Finally, we allowed the error terms for "age" and "education" to be correlated after observing a very large modification index when their association was not allowed to be free. Because this modification index was large despite the association in the model of the two latent variables ("couple's age" and "couple's SES"), to which these two observed variables contributed, we assumed that the wife's age and education had an additional, independent association not accounted for by the prediction of "couple's SES" by "couple's age." The standardized parameter estimate for this association was $.064$.

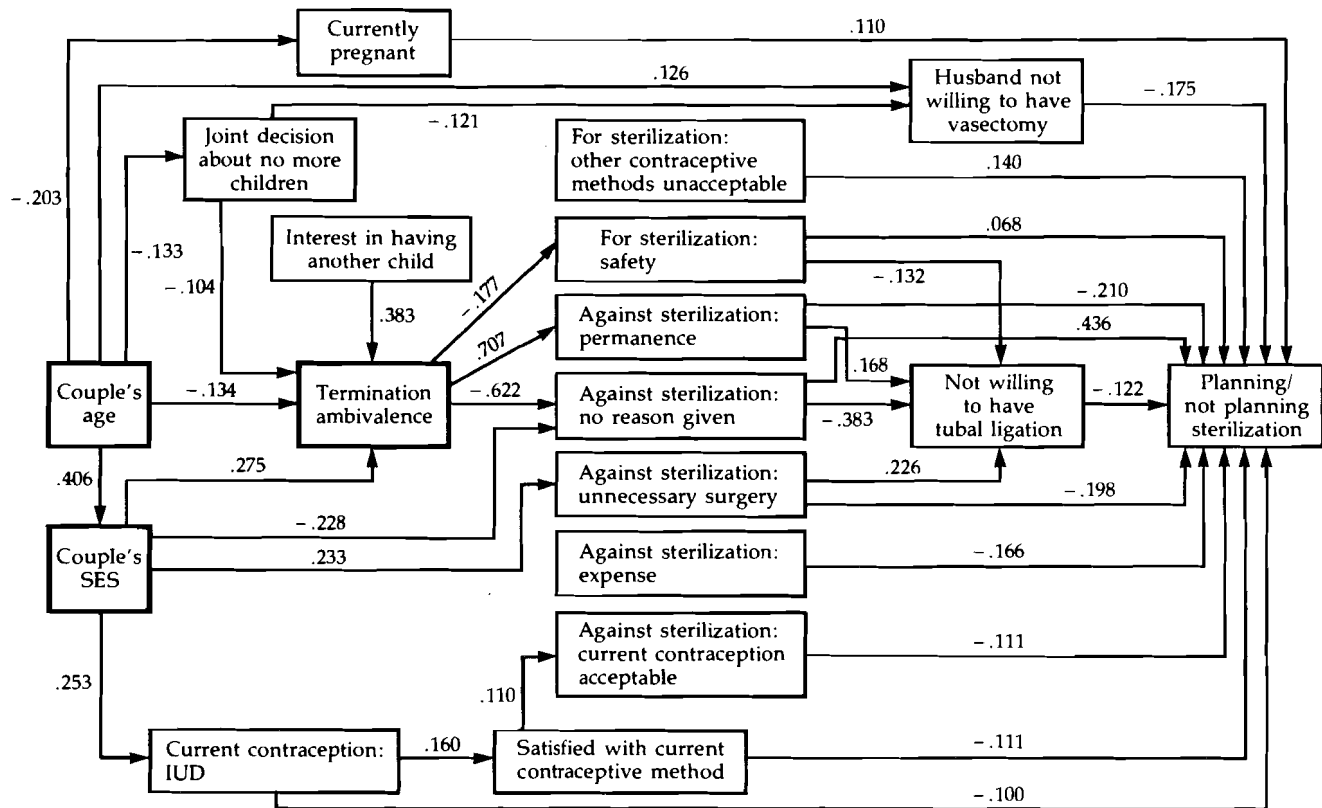


Figure 13.1. LISREL structural model of sterilization choice

The goodness of fit of the LISREL model just described and represented in Tables 13.1 and 13.2 and in Figure 13.1 was acceptable even though the X^2 did not achieve nonsignificance (which would have suggested that deviations of the data from the model were due to chance). With an N of 619 and 188 degrees of freedom, the X^2 was 281.22 ($p < .001$) and the X^2/DF ratio was 1.496. The goodness-of-fit index was .944 (.924 adjusted) and the root mean square residual was .047. Only one out of 253 normalized residuals was greater than 3, and only five were greater than 2.5. A Q -plot of the normalized residuals revealed that they were normally distributed.

As Figure 13.1 illustrates, couples tended not to plan sterilization when either the wife or especially the husband was unwilling to be sterilized. As we had postulated in structuring the model, the reasons both for and against sterilization (a high score means the reason was endorsed) had a direct effect on planning sterilization, and four of them had an indirect effect through the wife's willingness to have a tubal ligation. By far the strongest effect was demonstrated by those women who indicated they had no reasons for not planning sterilization.

Contrary to what we had postulated in structuring the model, however, the termination-decision variables had no direct effects on planning for sterilization, acting principally through reasons for and against sterilization. The main causal sequence involving the termination variables was the following: interest in having another child increased ambivalence about terminating childbearing, which in turn increased the wife's tendency to cite permanence as a reason for being against sterilization and decreased her tendency not to cite some other reason against sterilization. As expected, when the termination decision was made jointly by both spouses, the wife's ambivalence was less and the husband was more likely to be willing to have a vasectomy. Three-way cross-tabulations demonstrated that the husband's being unwilling occurred primarily in nonjointly-made decisions where the wife was the more influential in making the termination decision.

Both satisfaction with their current contraceptive method and current use of an IUD disposed the women not to plan sterilization, IUD use acting both directly and indirectly through satisfaction. Being pregnant, however, was associated with planning sterilization. As we had postulated, all of the effects of the sociodemographic variables on planning sterilization occurred through the other types of variables in the model.

Several variables were significantly associated with planning sterilization but at more than the $p = .001$ level and were therefore excluded from the model. Women whose most recent pregnancy was not intended, who had more recently decided not to have more children, who did not have excellent physical health, or who believed that sterilization was a way of reducing marital problems were more likely to plan sterilization than were

other women. Women who were more involved in religious activities or were anxious about having surgery were less likely to plan sterilization.

DISCUSSION

The results of the LISREL analysis support the first and third components of our general model. They provide evidence of a decision-making sequence leading to the choice of sterilization in which variables related to the termination decision are antecedent to variables related to the sterilization decision, which in turn are antecedent to variables related to the sterilization method decision. The results also support the notion that the effects of sociodemographic factors on the sterilization decision are mediated through the action of psychological and behavioral variables. A useful way of unifying these findings in one expression is as follows: the decision to select a particular type of sterilization is made within the context of a woman's evaluation of sterilization versus other classes of contraception; that evaluation is itself made within the context of the woman's childbearing desires and plans; and, finally, those desires and plans are formed within the context of the couple's sociodemographic status.

The LISREL analysis only partially supports the second component of our model. On one hand, the results seem to underline the importance, in planning or not planning sterilization, of substantive factors, including reasons for being for or against sterilization, such personal feelings as ambivalence about not having more children, and motivational considerations such as willingness to be sterilized or interest in having another child. On the other, processual factors related to couple interaction seem to be only weakly represented, most obviously by the joint decision variable. However, it should be noted that, on the basis of our earlier research (Miller et al. 1985-86; Shain et al. 1984), the two willingness variables also reflect couple interaction, and in particular couple dominance in the termination and sterilization decisions.

What is especially interesting is the absence of situational effects in the final model. Respondents were asked about the importance of social pressure and the effect of recent life events. They were also asked about the number of people they knew who had had vasectomies or tubal ligations and how many of those people were satisfied or dissatisfied. None of these variables was retained in the model. Although we may not have asked the appropriate situational questions or the ones we did ask may not have been valid measures, we did find situational factors operating in a previous analysis of determinants of the sterilization method decision (Miller et al. 1985-86).

It is also noteworthy that the woman's perception of her own fecundity was not retained in the model, suggesting that this consideration is not of major importance in the sterilization decision. In contrast, the woman's cur-

rent contraceptive method, both her satisfaction with it and if she was using an IUD, does seem to be important in the decision. It is not surprising that women who were satisfied with their current method were not inclined to choose sterilization. Nor is it surprising that women who had selected and were currently using an IUD successfully tended to be satisfied with it and disinclined to switch to sterilization. The IUD is very convenient, and if it is working effectively and satisfactorily, why switch?

It is not possible to relate the "currently pregnant" variable to just one step in the decision-making sequence because it would appear to have significance for all three of the decisions about termination, sterilization, and sterilization method. For example, getting pregnant may hasten or precipitate the termination decision if the couple realizes that this child is enough or even one too many. Pregnancy may also prompt the sterilization decision if it leads the couple to conclude that alternative methods do not provide adequate protection for them. Finally, it may lead to the selection of tubal ligation because of the convenience of having the surgery done in conjunction with delivery (Miller et al. 1985-86; Shain et al. 1985).

Only two antecedents predicted the husband's not being willing to have a vasectomy, and both were distal from that willingness variable in terms of the decision-making sequence that we have outlined. It should be kept in mind, however, that our data were collected from women only and dealt mostly with their motivations and perceptions of processes and contexts. Had we included more questions about the wives' perceptions of their husbands' motivations or, better yet, collected data from the husbands themselves, the antecedents to the husbands' willingness would probably have been as richly developed in the LISREL model as the antecedents to the wives' willingness were.

Several significant variables not included in the model suggest motivations for choosing sterilization: lack of success in avoiding pregnancy, poor health, and a desire to reduce marital tension. Others suggesting motivations against choosing sterilization are religious objections and anxiety about surgery. One variable relates to the choice of sterilization in what initially seems to be a counterintuitive way: women who made the termination decision most recently tended to choose sterilization. We interpret this finding as reflecting a sampling effect. As time passes after the termination decision, the proportion of women choosing sterilization reaches a plateau. As a result, the population of nonsterilized women is heavily weighted with women who made their termination decision relatively longer ago.

In addition to many of the couple interaction variables, all of the social context variables, and perceived fecundity, other variables surprised us in their failure to achieve a significant association with choosing sterilization. Perhaps the most interesting were the sexual variables. Although we asked a number of questions about sexual desire, satisfaction, and behavior, none

of those variables proved important in the decision. We also expected that certainty of marital stability, unwillingness to abort an unwanted pregnancy, and a desire on the woman's part to join the labor force would increase her tendency to choose sterilization; but these relationships were not confirmed.

In conclusion, two caveats about the model should be mentioned. First, the LISREL analysis confirmed the fit of the model only as we structured it. It is possible that other arrangements of the same data would generate an equally acceptable fit. Nevertheless, there are strong arguments for accepting the model that has resulted from our analysis. It has many features that are intuitively appealing and consonant with the existing literature. Moreover, LISREL is very sensitive to the presence or absence of variable relationships that do not adequately represent the data. For example, if the bivariate relationships between age and planning sterilization were not adequately expressed in the model, the LISREL analysis would reveal the strain caused by that inadequacy through such measures as modification indices and normalized residuals.

The second caveat is that the richness of the model depends completely on the ultimate dependent variable, planning sterilization. The reason is that all the predictors were selected on the basis of their bivariate relationship with that dependent variable. Clearly, our prediction of some of the other dependent variables, such as ambivalence or contraceptive satisfaction, could be greatly enriched by a whole series of additional analyses in which we screened for predictors of those variables. It is even probable that, in conducting those additional analyses, we would identify significant predictors of planning sterilization whose importance is not apparent in their bivariate relationship with that variable. An indication of how this might occur is apparent in the relationship between a couple's age and ambivalence. The bivariate relationship is not significant, but in the model the reason for this becomes apparent: the significant positive relationships that occur indirectly through the couple's socioeconomic status and the joint decision variable just about balance the significant negative relationship that occurs directly. In spite of the obvious appeal that lies in enriching this model further, doing so would greatly increase the difficulty both of achieving a satisfactory end point in the analysis and of communicating meaningful results. For these reasons, we elected to limit ourselves to a simpler approach.

CONCLUSION

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14 Toward a Framework for Understanding Contraceptive Method Choice

by Rodolfo A. Bulatao

Choosing a contraceptive method involves a variety of considerations, from personal predilections to the methods available and their cost. The factors important in choice vary from person to person, from place to place, from time to time. Much research on choice has therefore been highly specific, referring to choice of particular methods by particular groups of users or potential users. This chapter attempts to summarize what is known about determinants of choice of particular methods, drawing not only on the preceding chapters but also on the large but somewhat disorganized literature on choice. A simple framework is used to consider psychological, sociodemographic, and economic factors together.

A wide latitude for choice exists (as Palmore and I note in Chapter 1). No contraceptive method commands as much as half of the contraceptive users in 30 out of 47 developing countries. The exceptions are mainly sub-Saharan countries where contraceptive use is still low and traditional methods as a group consequently predominate. The leading methods vary from country to country. In survey data to date, the pill has most often been the leading method, usually accounting for 20 to 40 percent of users in Latin America and the Caribbean and more variable percentages in Asian countries. Intrauterine devices (IUDs) and condoms, on the other hand, are chosen by under 10 percent of users in the majority of countries, and their shares have been largely static. Among developing countries, nonsupply methods are less popular: rhythm commands about the same share as IUDs and condoms, withdrawal a somewhat smaller share. The remaining methods, such as male sterilization, injectables, and vaginal methods, all have smaller shares, though in particular countries they may be important. Many unique country patterns exist—for example, the popularity of rhythm in Peru, of vasectomies in the Republic of Korea, and of condoms in Singapore (UN, Department of International Economic and Social Affairs 1984; Bulatao 1985a:27).

Accounting for the individual choices that produce this variation is not a simple task. Although practical, empirical knowledge does exist about the contraceptive choices people make in specific circumstances, systematic treatment of the underlying factors in choice has been largely inadequate. Two previous theoretical approaches will be considered, and then a simple framework will be offered.

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PREVIOUS APPROACHES

One common way to assess contraceptive methods is to list their individual advantages and disadvantages, or, in a more sophisticated fashion, to identify the dimensions along which they vary. Freedman and Berelson (1976:14), for instance, set up 12 criteria that contraceptive methods should meet. A method should be medically safe and effective and provide continuity or effective reversibility if that is desired. These three qualities they considered intrinsic. In addition, a method should be socially acceptable in several senses. It should have such qualities as simplicity, independence from the sex act, and freedom from "nuisance" side effects. It should be consistent with local customs—for instance, respecting the aversion in some cultures to handling genitalia. Its use should not violate religious doctrine. It should have either no effect or a positive effect on sexual pleasure. From the medical perspective, it should be easily administered and leave physiological functions unaffected. For organizational and logistic purposes, it should not require extensive supply lines and should be easy to promote by word of mouth. Its economic cost to individuals and society should be low. For political reasons, it should not appear to be a foreign product or raise other symbolic issues. And for philosophical reasons, its use should be consistent with free choice.

Contraceptive acceptability research has been concerned with investigating such method qualities as these and their effects on contraceptive use, with the goal "to modify technology and programs to fit people" (Marshall 1977:65; see also Keller 1979). It has occasionally focused on previously unrecognized or underestimated factors in contraceptive choice, an example being the effect of the IUD on menstrual bleeding patterns (Polgar and Marshall 1976). Elaborate schemes to encompass these and other method characteristics have been offered in the literature, most recently under the rubric of the "costs of fertility regulation" (Exhibit 14.1).

Perhaps the most interesting aspect of acceptability research, in relation to questions about contraceptive method choice, is what it says about the

Exhibit 14.1. Three systems for classifying costs of fertility regulation

1. Monetary, health, normative, and psychic costs of contraception (Schearer 1983; Bogue 1983:153)

Monetary costs

- Private-sector costs

- Public-sector costs

Health costs

- Serious side effects

- Minor, short-term side effects

- Fears about side effects

Exhibit 14.1. (continued)

Normative and psychic costs

- Threat to cultural values and norms
- Challenge to social institutions and group values and norms
- Foregone perceived benefits of childbearing
- Inconsistency with personal values and norms
- Anxiety costs of practicing contraception
- Perceived accessibility of services (psychologistics)

2. Classification of the costs of fertility regulation (Bulatao 1984:173)

	Costs of access		Costs of use	
Economic and health costs	Travel to source (availability)		Monetary costs of devices, services	Health risks <ul style="list-style-type: none">• Mortality• Morbidity
Psycho-social costs	Information costs	Perceived barriers to obtaining services (perceived availability)	Costs tied to method attributes <ul style="list-style-type: none">• Perceived side effects• Uncertain effectiveness• Inconvenience of use• Other attributes (route of administration, duration of action, reversibility)	
	Costs of fertility regulation as proscribed behavior <ul style="list-style-type: none">• Violation of personal beliefs• Marital problems• Social and religious disapproval			

3. Costs of fertility regulation (Nag 1984:20)

Physical/health costs

- Disruption of menstrual cycle
- Other side effects and health hazards
- Perceived health hazards based on ethnophysical concepts
- Sacrifice of sexual pleasure

Psychic costs

- Violation of sexual modesty and human dignity
- Conflict with own religious beliefs

Social opinion costs

- Challenge to spouse and sex-role expectation
- Challenge to social influence group

Economic costs

- In absence of program
- In presence of program

relative importance of methods' attributes. Effectiveness appears, from studies conducted in rural villages in the Philippines, the Republic of Korea, Indonesia, and Mexico, to be the most important attribute; absence of side effects and convenience are also important; route of administration (oral, injectable, or vaginal insertion) is less important; and frequency of use is least important of these five attributes (Hollerbach 1982:11). Regarding side effects in particular, a contrast appears between more developed and less developed countries. In more developed countries, serious health hazards discourage adoption of a method or cause its discontinuation and may even trigger official regulation. Users appear widely tolerant of minor side effects, however. In less developed countries, knowledge of hazards is lacking and regulation weak. Fears about serious health effects are widespread and often inaccurate, however, reducing use of contraception and choice of specific methods. In addition, minor side effects lead to much more discontinuation of particular methods than in more developed countries (Schearer 1983:117-122).

A more systematic alternative to acceptability research that also looks at specific contraceptive methods and their attributes is research on subjective expected utility models (see Chapter 2, by Davidson). Earlier work in this area focused on having or not having another child, on using or not using contraception, and on similar decisions, occasionally with regard to a specific method such as the pill (see, e.g., Insko et al. 1970; Jaccard and Davidson 1972). Subsequent studies were concerned with choice among alternative methods. For example, reports, mainly on small U.S. samples, have shown an association between intentions to use the pill instead of other methods and the belief that it is morally acceptable and reliable, and that it has no major side effect except the positive effect of regulating the menstrual cycle (Jaccard and Davidson 1972:232).

The main interest in this research, however, has not been with specific methods and their particular attributes, but with how perceptions and evaluations are combined into unitary judgments of each method that may affect intentions or behavior. At least three models exist for combining perceptions and evaluations into judgments (Pagel and Davidson 1984). The models differ in their incorporation of perceptions of relevant others' attitudes, whether they assess the effect of methods in both providing and blocking the attainment of particular values, and whether they take account of the possibility that values may be attained even without the specific method. Approaches also differ in whether they predict intentions from judgments about each method separately or from judgments about one method relative to others; the latter procedure seems preferable (Davidson and Morrison 1983). Few of these studies have tested the models against substantially different decision rules, although at least one of them found individuals reporting that they "settled for the least of the worst" or chose

the "least bad alternative" (Cohen et al. 1978), a decision rule at odds with the usual models.

Neither acceptability research nor research on expected utilities has paid more than passing attention to individual socioeconomic characteristics that have been shown to relate to method choice. Little previous work, in fact, has attempted to take such factors into account. Kahley and Gillaspay (1977) did propose a relevant economic model, focusing on price, budget constraints, somewhat ill-defined "setting" variables, and other influences including physiological complications. Until fairly recently, however, this work was not extended.

ANOTHER APPROACH

Contraceptive method choice is viewed in this chapter as being affected by four types of factors: contraceptive goals, contraceptive competence, contraceptive evaluation, and contraceptive access (Exhibit 14.2).

Contraceptive goals involve the specific fertility effect a woman or a couple seeks to achieve through contraception. A basic distinction is between the goal of avoiding all future births or postponing the next birth. Other aspects of goals are also important. For example, the number of births to be averted or the period of postponement desired before the next birth may affect contraceptive choice (Michael and Willis 1976). The degree of flexibility of goals may be important. Women who consider it imperative to avoid further births should feel more pressure to make appropriate fertility decisions than those who would like to avoid further births but would not be seriously inconvenienced by another child (Retherford et al. 1988).

Contraceptive competence is the ability to use a particular method effectively. Some methods require more understanding, care, and diligence than others. How well a method is understood obviously involves not only characteristics of the method but also the amount of information available and individual and class differences in access to information. Competence at using a method is not purely cognitive; it also involves affective components, particularly attitudes toward sex and competence in sexual matters.

Exhibit 14.2. Factors in contraceptive choice

Contraceptive goals	Contraceptive access
Limiting versus spacing goal	Availability
Number of births to be averted	Promotion and service
Length of intended interval	Affordability
Flexibility in goals	Contraceptive evaluation
Contraceptive competence	Practical preferences—side effects
Understanding of method	Practical preferences—convenience
Sexual attitudes and competence	Moral preferences
Spouses' ability to cooperate	

Because some methods require cooperation between the spouses or at least the acquiescence of the partner, the ability to cooperate is another aspect of contraceptive competence.

Contraceptive evaluation involves judgments about the practical and moral implications of using a specific method. The concept of evaluation can, in principle, be extended to cover all relevant features of a method. Here I use the term more narrowly to refer to aspects of use, not of access, and to side effects or side issues, not to the major goal of contraception, to avert a birth. Effects on health, both major and minor, fall under the category of practical implications, as do issues of convenience and effects on sexual pleasure. Moral judgments are considered to be distinct from practical judgments, but they are also an aspect of evaluation.

Contraceptive access is the last dimension. To be used, a method must first be available, though what constitutes adequate availability may vary with circumstances. Promotion of a method—through the media, through face-to-face contacts, by program personnel, by physicians, and so on—can add significantly to method choice. Providing medical advice may be considered a promotional activity. The affordability of a method to the individual is an additional issue; clearly, affordability is affected by the presence or absence of government subsidies.

These four dimensions are essentially a reordering of factors that appear in other approaches, as illustrated in Exhibit 14.1. Previous frameworks have focused on the attributes of contraceptive methods. This framework focuses on the individual, who formulates goals, has some learned competence that can be developed further but also some limitations, makes evaluations relative to personal standards, and, because of residence, contacts, and income, has variable access to specific methods. Previous frameworks have led to suggestions for improving methods. This framework is meant to lead to a better understanding of personal choices. For instance, with previous frameworks in mind, some authors have suggested that methods that produce higher continuation rates should be developed and promoted. With the present framework, one would be more liable to ask instead whether a method might not have been chosen specifically because it was easy to discontinue. The present framework also directs attention to socioeconomic correlates of choice and provides possible interpretations for their effects.

In the remainder of this chapter, findings relative to choice of various methods are summarized and interpreted within this framework. How judgments across different dimensions are combined and other relevant questions are then considered.

APPLICATIONS

This review of previous empirical work considers the choice of rhythm, condoms, the pill and the IUD, and sterilization, proceeding from less effec-

tive to more effective methods. In the case of rhythm and condoms, the focus is mainly on a single study of each. In the case of the other methods, various studies are discussed.

Rhythm

Rhythm, or periodic abstinence, is the contraceptive method of choice for substantial numbers of women in a few countries, including Peru, Sri Lanka, the Philippines, and Ireland. In most countries, however, its share of contraceptive users is under 10 percent, and its prevalence among married women of reproductive age is under 5 percent (UN, Department of International Economic and Social Affairs 1984:40–50; Liskin 1981:57). Nevertheless, some rhythm use appears in almost every country, most of it calendar rhythm rather than newer, more reliable methods for determining the fertile period.

One study (Bulatao 1985b) analyzed the determinants of rhythm use with cross-national data as well as with data on married women from surveys done in the mid-1970s in the Philippines, Turkey, Indonesia, Thailand, the Republic of Korea, Taiwan, Singapore, and the United States. A framework like that presented here was used to generate hypotheses to explain the relationship between the choice of rhythm and late marriage. Multivariate analysis was run both cross-nationally and across individuals, turning up some explanations for the relationship and some additional explanations for rhythm use. The present discussion draws mainly on that study.

Contraceptive goals. As a less effective method, rhythm may be assumed to be appropriate for those wanting larger families. However, family-size preferences fail to predict which individuals use rhythm rather than other methods. Rough indicators of the “supply” of children are also not predictive, suggesting that the number of births a woman wants to avert is not the main consideration.

Contraceptive goals are important, nevertheless. With family-size preferences controlled, rhythm users are observed to initiate contraception at lower parities than users of other methods, suggesting that choice of rhythm is linked to the desire to space births. A review of survey reports by Liskin (1981:60) also concluded that rhythm use was in many cases 50 percent higher among women who wanted to space births than among those who wanted to prevent births. Since those who marry late are more likely than those who marry early to want to space births, this difference in goals partly explains a relationship (evident in both cross-national and individual data) between late marriage and use of rhythm.

On the assumption that economic insecurity can lead to less flexibility in contraceptive goals, I investigated the possibility that higher income would allow more use of a less effective method such as rhythm. Neither the cross-national nor the individual analysis confirmed this hypothesis. Only one aspect of contraceptive goals, therefore—the desire to space chil-

dren regardless of their ultimate number—appears to be related to the choice of rhythm.

Contraceptive competence. The effective use of rhythm requires some knowledge of the menstrual cycle, which most couples, even those using the method, do not have. Surveys in nine countries in the early 1970s showed that as few as 4 percent of rhythm users (in Jamaica) knew that peak probability of conception occurs around midcycle. In five of the other countries the proportions were under 20 percent, and the highest proportion (57 percent in Antigua) was still unacceptably low (Liskin 1981:60). One may expect better knowledge, and therefore greater use of rhythm, among the more educated. Surveys in the Netherlands, Malaysia, Sri Lanka, and elsewhere support this conjecture (Moors 1974:111; DaVanzo et al. 1986; Chapter 8, by Chamrathirong and Stephen, in this volume; Chapter 9, by Gajanayake; Liskin 1981:60). Multivariate analysis across individuals in Bulatao (1985b) confirms the contribution of education to rhythm use, but cross-national analysis does not confirm it. The unreliability of many cross-national measures of educational achievement may explain these deviant results.

Rhythm also requires cooperation between spouses; and where cooperation is easier, competence at using the method may be greater. I tested this conjecture by looking at the age gap between spouses and by distinguishing families in which spouses shared activities and decisions from families in which they did not. The age gap was not an important factor in either the cross-national or the household analysis. Family sharing did promote choice of rhythm in some cases, though not in others.

The argument may be made that the ability to defer gratification should be related to using rhythm. I attempted to develop an appropriate index from attitudinal data, but it did not prove predictive.

Contraceptive evaluation. No direct method was available to assess whether concern about the side effects of other methods contributed to the choice of rhythm. If education can be assumed to mean better information about or more sensitivity to side effects, then the effect of education on rhythm choice may reflect this concern. Other data suggest that concern about medical safety and convenience leads to use of rhythm rather than to other methods. These were the leading considerations reported in an acceptor survey and in focus groups in the Philippines (Laing 1984:55–56).

Researchers have paid more attention to the moral considerations of rhythm choice than to its practical implications. The evidence regarding the importance of moral concerns is mixed, however. Among more developed countries, the proportion of Roman Catholics in the population significantly contributes to rhythm use. In the United States, being Catholic also increases the likelihood that a woman relies on rhythm; and being an

active rather than a passive Catholic is particularly important (see Chapter 12, by Rindfuss et al.). Other studies have confirmed the importance of religion in the United States (e.g., Westoff and Jones 1977) and in Australia (Caldwell and Ware 1973). As one would expect, given the blurring of religious differences in many developed societies, the religious differential in the use of rhythm is narrowing (Mosher and Goldscheider 1984).

Among less developed countries, however, the proportion of Catholics makes no difference to rhythm use. Within the less developed countries included in my study of rhythm use (Bulatao 1985b), no relation between Catholicism and reliance on rhythm was evident. Individual use of rhythm did appear to be consistently related in those countries to weaker approval of contraception in general. The relation of rhythm use to moral considerations therefore appears to be a complex one. In more developed countries, Catholic doctrine exerts sufficient hold to lead to greater use of rhythm; in less developed countries, however, this is not the case. In all the countries studied, in addition, a more negative attitude toward contraception (unrelated, it should be noted, to fertility preferences) led to choosing what might be considered the minimal method of rhythm.

Contraceptive access. Access to other methods affected the choice of rhythm. Across countries, rising contraceptive prevalence was associated with a falling share for rhythm. Among individuals, the cohort pattern suggested that more recent cohorts with better access to other methods were more often using them instead. The urban-rural pattern also suggested that better contraceptive availability was reducing resort to rhythm.

The importance of promotion was seen in the effect that family planning program duration had on reducing rhythm use. No direct evidence on the effect of promoting rhythm itself is available. As physicians do differ in their willingness to explain rhythm, however, differential promotion may be important. Interestingly, physicians in four less developed countries who would recommend rhythm were likely to consider it more scientific and useful than the pill (see Chapter 3, by Severy).

Financial cost also appears to be relevant. The higher the cost of other contraceptives obtained from private sources, the greater is the use of rhythm.

Other factors. The major determinant of rhythm use emerging from my (1985b) study does not fit too well into the framework because the reason for its effect is not clear. Late marriage partly affected contraceptive goals because it was linked to the desire to space children. It was also related to contraceptive competence through its link to education. However, late marriage had a positive statistical effect on rhythm use that remained strong even when these links were controlled. Why this was so is not clear; possibly more adequate measurement of the other dimensions of choice would explain the remaining relationship.

Another factor may be the way individual choices reinforce each other. A study in Sri Lanka indicates that most rhythm users depended on personal advice from someone else (see Chapter 9, by Gajanayake). If a sufficient number of rhythm users exist, personal networks may in various ways promote continued dependence on it. Such processes of social reinforcement or feedback also affect adoption of other methods (Palmore 1968).

Condoms

The choice of condoms has not been studied in a fashion similar to the choice of rhythm; and the condom, as a male method, is seldom included in comparisons among users of specific methods. Nevertheless, condom users account for a nonnegligible proportion of contraceptors: over 5 percent in every Western European country for which there are data and close to 40 percent in Denmark and Finland; and in Singapore and Trinidad and Tobago the proportions are close to 30 percent. Although the share of condom users among contraceptors has declined as other methods have been introduced, condom prevalence among eligible couples has remained stable over time in most of the less developed countries with data (Sherris 1982:132).

Because of the limited literature, the focus in this section is on condom use in Japan, the world leader, with three-fourths of all contraceptors relying on condoms and, reportedly, more than one-fourth of all the condom users in the world. The discussion here relies mainly on Coleman's (1981, 1983) analysis of the cultural factors behind this phenomenon. His investigation was based on a 1974-77 field study in the Tokyo-Yokohama conurbation, including anthropological observation, in-depth discussions and interviews with specialists, a questionnaire returned by 600 patients, and in-depth interviews with 22 couples.

Contraceptive goals. Condom use is more common in Japan than elsewhere early in marriage. In the Japan World Fertility Survey conducted in 1974, 100 percent of wives under age 20 using contraception relied on condoms; the proportion declined to 70 percent for wives 35-39. Other data confirm that, in the first year of marriage, the condom share is almost 90 percent, and almost all women report the condom as their first method (Coleman 1983:109). The explanation Coleman (1981:35) offers is that in the early years of marriage "couples are postponing or spacing births, so the need for contraceptive effectiveness is not felt as keenly as when the couple later begins to limit family size." By the time women have been married about five and a half years, use of all medical methods combined begins to outpace sole use of condoms, though not all use of condoms, singly or in combination.

Contraceptive goals may therefore be part of the reason for higher initial condom use in Japan. Even among recently married couples, however,

some want more effective contraception. Condoms may continue to be used in such cases (often together with rhythm) because couples rely on abortion as a backup. According to one estimate, there were 1.2 induced abortions per live birth in 1975 (Ross 1983:67). The greatest incidence of reported abortions is among women in the 25–29 age group, among whom condom use should still be quite prevalent.

In the less developed world, condoms are also used for spacing rather than limiting births. In 10 out of 17 less developed countries, fewer women who wanted to terminate childbearing were using condoms than were women who wanted more births (Sherris 1982:133). A study in the Republic of Korea found that couples wanting children in the future preferred condoms not only to sterilization and IUDs but even to rhythm and withdrawal (see Chapter 6, by Choe and Park).

Contraceptive competence. Lack of knowledge about other methods severely restricts their use in Japan, and inhibitions and other cultural patterns generate further difficulties. Coleman (1983:96) reports a “widespread reluctance—if not inability” among Japanese women to discuss contraception until they have become mothers. Strong sexual inhibition is also reflected in very low use rates for menstrual tampons and reluctance to seek gynecological care. With sexual assertiveness among women discouraged, wives rely on their husbands more than on any other source for information; but young men, despite enjoying more freedom in sexual matters, are not likely to learn about any method other than the condom from their peers. Wives who do use other methods are significantly less likely to have relied on their husbands for information.

Women are nevertheless often responsible for obtaining condoms. Both men and women buy condoms at drugstores, but women buy in greater volume. Home and supermarket sales, and much advertising, are directed at women rather than at men. Condom use therefore does not imply that men assume sole responsibility for contraception.

With more education, Japanese women are more likely to use modern medical methods. This relationship is confirmed by a multivariate regression of Coleman's (1981:33–34) data, which included information source, income, marriage duration, and number of abortions. Coleman argues that education contributes to an understanding of medical methods, and therefore makes them psychologically more acceptable. In addition, education gives a woman more leverage in her marriage and more confidence in taking the initiative in contraception.

Contraceptive evaluation. The effect of condoms on sexual pleasure is not dismissed: husbands in particular complain about the dulling of sensation from condom use, and both husbands and wives object to the interruption of lovemaking required for application. A conjecture can be offered for why

this does not lead to lower condom use. Indirect evidence suggests that Japanese women derive less pleasure from sex than do Western women. Surveys comparable to Kinsey's have indicated that much higher proportions of Japanese wives have not experienced orgasm even after 15 years of marriage. In addition, rates of masturbation among young women are low, and a high proportion of women express their dislike of sex, saying they merely tolerate their husbands' desires (Coleman 1983:162). These findings may explain why few women make efforts to maximize (their husbands') sexual pleasure, accepting the limitations of the condom instead of investigating alternatives. Some indirect corroboration for this hypothesis comes from a study of a different method in a different culture: Lebanese women who elected not to be sterilized, after inquiring about the procedure, tended to view sex as a male pleasure and were less likely than other women to experience orgasm (Chamie 1977).

Fear of side effects from using other methods, especially the pill, is common in Japan; condom saleswomen capitalize on this fear by characterizing their product as "harmless." Negative media treatment of the pill may explain some of the fear, but ignorance and unfamiliarity may be more important causes. Perceived problems with other methods, including aversion toward vaginal methods due to dislike of handling the genitals, may similarly reflect lack of knowledge.

Japanese women who do use modern methods tend to emphasize safety in their method choice more than do women relying on the condom. This may mean that familiarity leads to a more objective assessment of risks, but it may also mean that a change in evaluation leads to greater adoption of modern methods. One circumstance that does seem to lead to a change in evaluation is the experience of induced abortion. Women who have had more abortions are more likely than other women to use medical methods. Coleman (1981:34) discounts the possibility that medical advice is the explanation, since few physicians in Japan provide postabortive guidance. Abortions often involve guilt feelings, though not serious emotional pathology. Public hospitals do not offer abortions on an outpatient basis, and women maximize concealment by going to physicians other than their regular obstetricians and gynecologists. Having an abortion therefore involves some stress and may induce a shift to a more reliable method.

Contraceptive access. The importance of limited access to other methods is abundantly clear in Coleman's discussion of condom use in Japan. The availability of condoms far exceeds the availability of other methods. Sophisticated marketing practices, heavy advertising, packaging innovations, door-to-door sales, and virtual saturation of possible points of purchase all support the choice of condoms. Abortion, needed as a backup, is also available on a fee-for-service basis. Alternative methods are much

harder to obtain. The pill is not even considered a contraceptive method and is legally prohibited, with the support of the medical community, though in practice physicians are free to dispense any form of contraception.

Medical personnel provide little guidance regarding other methods. Promoting inexpensive, effective contraception would reduce the income, sometimes concealed, that physicians derive from performing induced abortion. A tax investigation of 700 obstetrical and gynecological facilities in 1973 turned up nine million dollars in untaxed income, practically all from unreported abortions (Coleman 1983:39). Family planning counselors, most of them midwives, provide lectures about contraception, but confine them to traditional methods and afterward dispense mainly condoms. Ninety percent of the Japan Family Planning Association's contraceptive sales are of condoms, and prices are arranged so that the midwife dispenser makes more profit from a condom client than from someone using spermicides or a diaphragm (Coleman 1983:44-50).

Appropriate medical advice can alter method choice. In Coleman's (1981:33) survey, women who had received information on their method from a specialist were more likely to be using a modern method. The specialists who cooperated in the study, a selected group particularly active and innovative in family planning, cannot be considered typical, however.

Cost factors favor condoms. To the client, they cost slightly more than spermicides or the diaphragm, but much less than the IUD or pills. Sterilizations are also more expensive, and the costs are not covered by national health insurance. Pills could be covered, but insurance inspection teams composed of obstetricians and gynecologists prevent it. Contraceptive costs can therefore take up a substantial part of a couple's budget—a much larger share than in the United States, for instance. The importance of cost is reflected in a significant positive relationship established through regression between husbands' income and use of medical methods (Coleman 1981:33).

In other countries, the importance of access is evident in the greater prevalence of condom use in urban areas, where retail outlets tend to be concentrated, than in rural areas. The effect of travel time has been demonstrated in the Philippines, where, among women with no source within half an hour, condom use was half that among women who had a source within 15 minutes (see Chapter 4, by Jones). Condom users who rely on commercial sources are also sensitive to price: according to Schwartz et al., in Chapter 5, a price increase of one standard deviation cut condom use by 30-45 percent in the Philippines, Jamaica, and Thailand. These effects of travel time and price are unmistakable for condoms, but not for other methods.

Other factors. The chief additional factor in Coleman's discussion of condom use in Japan is the interrelation among all the separate factors and the way they reinforce each other. Low status for women and little interest in sexuality, for instance, mean there is little public pressure for better contraceptive access. This, in turn, allows the medical profession to pursue its own economic interests, which are based on maintaining continued ignorance about other methods, and that ignorance prevents women from seeking them. The importance of feedback among these factors is seen in one reason commonly given for using the condom: that everyone else is using it.

Pills and IUDs

Oral contraceptives and IUDs are considered together because the relevant research, such as it is, usually contrasts use of these two methods, generally with the inclusion of other modern methods such as injectables. Neither an intensive study nor a convenient summary of research on pill and IUD acceptors has been located, and this section therefore draws upon several small studies of clinic acceptors.

Contraceptive goals. Wanting another child at some future time is more common among those using the pill than among those using the IUD, though many pill users also do not want another child (Bauman and Varavej 1972; Chumnijarakij et al. 1981). A study of 3,000 Philippine contraceptive acceptors found that, among 51 those who wanting no more children, 51 percent were pill users and 22 percent were IUD users, whereas among those wanting an additional two or more children, 61 percent were pill users and only 14 percent were IUD users (Ballweg 1972:417). Women may also tend to choose the pill when deciding on contraception soon after giving birth. The evidence is somewhat confusing on this point (Chumnijarakij et al. 1981; WHO Task Forces 1980), possibly because postpartum use of the pill is not advisable, given its effect on lactation.

Wanting another child was not a significant factor in pill or IUD use in a regression analysis of Colombian acceptors, though number of living children and the woman's age were significant (Kahley and Gillaspay 1977). Several studies have found pill acceptors to have fewer children and to be younger than IUD acceptors (Ballweg 1972; Chumnijarakij et al. 1981).

One noteworthy study, however, did not find these demographic differences. Two World Health Organization task forces collaborated on a study of the pill, the IUD, and an injectable in India, the Republic of Korea, the Philippines, and Turkey (WHO Task Forces 1980). Women requesting contraception were given complete and balanced information about all three methods and allowed a free choice. Under these conditions, number of living children, age, and marriage duration differed little among those choosing each method. Nevertheless, the effect of contraceptive goals was still

evident: among those wanting more children in each country, more women chose the pill than chose the IUD.

The Colombian analysis had a further interesting finding. Age and number of children interacted in affecting method choice: the likelihood of choosing the IUD increased with number of children, and this increase was greater among younger women (Kahley and Gillaspay 1977:142). This finding suggests that rapid childbearing, which implies the need to avert a larger potential number of births, inclines women more toward the IUD than forward the pill.

Contraceptive competence. Previous use of a method generally inclines one to view it more favorably (Houser and Beckman 1978:10). Continued use of the same method is common even after a balanced educational presentation, although this is more true of the pill than of the IUD (Chumnijarakij et al. 1981:252). One possible explanation is that experience allows one to develop some competence in using or tolerating the pill, as opposed to the IUD. This explanation does not account for equally high proportions continuing to favor injectables, but other method attributes may be important in that case.

One may expect the greater diligence required for pill taking to be reflected in higher adoption rates at higher educational levels. This appears to have been the case in one Thai study (Chumnijarakij et al. 1981:251) and in Colombia, where the wife's education was a significant factor favoring the pill over the IUD (Kahley and Gillaspay 1977:141). The results of other studies are less clear, however. In a Philippine study, the pill had slightly less acceptance than the IUD among high school graduates (Ballweg 1972). In a study of American blacks, education was related to choice of the IUD, though apparently not significantly (Cochrane 1975). Because education may be related to access to contraceptive supplies as well as to medical care, these relations may reflect something other than competence. In addition, during the mid-1970s the IUD was a relatively new method, and perhaps for that reason more accessible to better-educated women, as Cochrane (1975) suggests. The Colombian study, it should be noted, was the only one of these studies to control income as a possible indicator of access.

It is not surprising that education failed to predict choice after a balanced discussion of various methods (WHO Task Forces 1980:270). The information and free choice afforded should have wiped out any preexisting differences in competence or access.

Contraceptive evaluation. When nonterminal methods were compared with sterilization in an Indian study (M. E. Khan 1977:9), the main reasons given by those preferring nonterminal methods had to do with medical risks and fears associated with sterilization. Choice of the pill or the IUD therefore has something to do with an evaluation of its safety and convenience as

compared with the safety and convenience of alternative methods (Houser and Beckman 1978:15).

Studies routinely note women's fears about side effects when they are asked about the reasons for their choice (e.g., WHO Task Forces 1980:272), but the precise effect such fears have on choice needs more systematic investigation. One possible indicator of their effect is the proportion of those discontinuing who do so because of disagreeable health effects. In a Thai study, the proportion was 31 percent among pill discontinuers, many others of whom discontinued to have a child, and 79 percent among IUD discontinuers. Similarly, after hearing a balanced presentation, 65 percent of pill users but only 27 percent of IUD users stayed with their initial method (Chumnijarakij et al. 1981:252-253). Decisions to discontinue and switch may both be based on health concerns.

Contraceptive access. The availability and promotion of the pill and the IUD have much to do with their popularity in specific countries. Generally, pill use is highest in Latin America, where supplies come mainly from commercial sources (Kols et al. 1982:194). The availability and promotion of the IUD may be responsible for its increased use in Europe, together with adverse publicity about side effects of pills (Liskin 1982:109). Earlier promotion of the IUD appears to account for more rural than urban use in the Republic of Korea (see Chapter 6, by Choe and Park).

Access to a source of continuing supply is at least as important for the pill as for any other method. One study (Cornelius and Novak 1983:313-314) reported that over 90 percent of urban women in Thailand, Honduras, and Colombia had easy access to the pill, living not more than 30 minutes from a source. Even better access did not mean more pill use in those areas, however. Rural women in Thailand also had easy access to pill sources, but rural women in Colombia and Honduras generally had to travel longer distances. In rural Colombia and Honduras, consequently, travel time to source was strongly associated with pill use. Jones (1984; Chapter 4 in this volume) has confirmed the association in multivariate analysis for Egypt, though results for other countries are less consistent. Travel costs appear to have less effect on IUD use than on pill use.

Kahley and Gillaspay (1977) assumed that use of the pill and the IUD in Colombia would be proportional to their relative prices, and regression results did not disconfirm this hypothesis. Household income proved to be significantly related to choice of the pill, the more expensive of the two methods. A more detailed investigation in the Philippines, Jamaica, and Thailand has suggested, however, that the price effect should not be overestimated. Where free contraceptives were also available, those choosing to purchase them commercially were not greatly affected by price variations within the typical range (see Chapter 5, by Schwartz et al.).

Sterilization

A wider variety of studies than those on pill and IUD acceptors provides relevant information on sterilization. Few of them directly compare sterilization acceptors with acceptors of other methods, but implications can nevertheless be drawn. Findings from these studies, including three independent summaries of literature (Green 1978; Daly and Darroch n.d.; Philliber and Philliber 1985), none of which cites the other two, come to similar conclusions. I discuss them here with reference to the theoretical framework.

Contraceptive goals. The choice of sterilization is clearly associated with contraceptive goals. Made largely, though not exclusively, by those desiring to terminate childbearing, it increases steadily in likelihood with a couple's age (see Chapter 6, by Choe and Park; Chapter 7, by DaVanzo et al.). In one Bangladesh study, virtually all sterilized women and men (between 89 and 99 percent in urban and rural areas) wanted no more children, compared with substantially lower proportions (37 to 83 percent) wanting no more children among those using the pill or injectables. Among the sterilized, the small minority who did want more children or were unsure were those who had lost a child or feared losing one (Swenson and Khan 1983:152). Except in Latin America, many couples seeking sterilization have had an unwanted child, often because of contraceptive failure. Having a child before the woman reaches age 20 and having more children in quick succession are also related to the choice of sterilization, possibly because of the childrearing burden these women experience rather than because of what they infer about their fecundity (Philliber and Philliber 1985:3; Chapter 13, by Miller et al.; Green 1978:52).

More clearly than research on other methods, research on sterilization addresses the question of whose desires or goals are relevant—the wife's or the husband's. The answer depends on who gets sterilized: for female sterilization, the wife's desire to terminate childbearing is more important, and the wife's influence on the decision greater; for male sterilization, the reverse is the case (Shain et al. 1984).

Having four to five children is typical among sterilization acceptors in Asia and Latin America (Philliber and Philliber 1985:3; Green 1978:51); for more developed countries, having two or more is typical (Daly and Darroch n.d.:6). The average woman choosing sterilization is in her late 20s or early 30s, whereas the average man is in his late 30s (Philliber and Philliber 1985:3; Green 1978:51). These patterns appear to reflect a link between the choice of sterilization and a desire to limit births. Over time, the mean age and parity of sterilization adopters has dropped (Ross and Huber 1983). This trend may simply mirror the worldwide declines in mean age and parity for all contraceptive adopters (Ross 1979). Declines in fertility prefer-

ences may be partly responsible but do not account for a great part of the secular trend (Bulatao and Cheung 1986), and changes in contraceptive access may be more important.

Contraceptive goals relevant to the choice of sterilization may be sex-specific. In several countries it has been noted that sterilization acceptors are more likely to have at least one son and have a larger proportion of sons than the average family, and no study has reported more than a few sterilizations among couples without a son (Philliber and Philliber 1985:3; Chapter 6, by Choe and Park). The health and age of children already born are additional considerations, particularly where infant mortality is high (Green 1978:52).

Various findings suggest the relevance to sterilization choices of having firm rather than flexible contraceptive goals. First, couples' ambivalence about wanting more children leads physicians to reject them as candidates for sterilization (Daly and Darroch n.d.; WHO 1985). Second, sterilization appears to increase when more women are employed outside the home (Philliber and Philliber 1985). Because these women have less leeway in allocating their time, the finding may suggest their need for certainty in avoiding pregnancy. Third, the economic costs of children are among the most commonly given reasons for seeking sterilization in developing countries (Philliber and Philliber 1985:6; Daly and Darroch n.d.:8; Mumford 1983:84). Perhaps the economic situation leaves little margin for error in childbearing, leading to the choice of sterilization; other interpretations are also possible, however. Fourth, a small Australian study of voluntarily childless couples found that "early articulators," those who made explicit decisions early in their relationship not to have children, were more likely to be sterilized than those who reached the decision gradually after successive postponements (Callan and Hee 1984). This finding may suggest that consensus on a definite goal favors sterilization, but at least two alternative arguments may be made: that early articulators have to avert a larger number of births than those who decide on childlessness after previous postponements, or that postponers have developed some competence with alternative methods that they are therefore more likely to continue to use.

Contraceptive competence. Because sterilization operations are in the hands of medical personnel, individual competence at the method would seem to be irrelevant. Nevertheless, individual competence does enter into choice of these methods in a few ways.

Ability to cope with sequelae, including the psychological implications, is one competence factor. Both female and male adopters are likely to be in long, stable, marital relationships (Green 1978:52). This association must be related to their having achieved their fertility goals, but in addition it presumably implies psychological stability and the presence of psychological support. Marital instability and a history of mental health disorder are

grounds for disqualifying potential adopters (Daly and Darroch n.d.; WHO 1985). Better marital relations, on the other hand, increase the likelihood of seeking sterilization in both Puerto Rico and Lebanon (Philliber and Philliber 1985:6).

Competence at contraception in general and experience with particular methods may also relate to choice of sterilization, especially to the choice between female and male sterilization. A comparison between white U.S. women who had undergone tubal ligation and women whose husbands had had vasectomies indicates that the vasectomies were preceded by significantly greater use of male methods and tubal ligations by significantly greater exclusive use of female methods (Shain et al. 1985:239). A study in Guatemala City showed greater previous use of condoms and rhythm, among other methods, for men who were sterilized than for women (Santiso et al. 1983:76).

Finally, sterilization may be chosen because couples perceive themselves to be incompetent at using other methods. An Indian study of male industrial workers reports that two of the major reasons subjects gave for preferring sterilization to nonterminal methods were that "other methods are unreliable" and that "other methods are not easy to use/troublesome." Together, these responses accounted for over one-third of the reasons given (M. E. Khan 1977:8). They may have implied a simple inability to use other methods effectively. This interpretation is supported by reports that many sterilization adopters—for example, more than half of vasectomy adopters in Colombia—have had a previous contraceptive failure. Previous failures have been reported even among those who used more effective methods (Green 1978:52).

Contraceptive evaluation. Although switching from other methods (particularly after experiencing contraceptive failure) may reflect lack of competence at using them, it may also reflect dissatisfaction with their characteristics or side effects. On one hand, the evidence from more developed countries that many couples have tried alternative methods and rejected them before the men choose vasectomy suggests that negative experiences with other methods may be a factor in sterilization decisions, particularly where temporary methods are easily available (Philliber and Philliber 1985:6-7; Daly and Darroch n.d.:9). On the other, satisfaction with other methods leads U.S. couples to pass up sterilization even when they have decided to stop childbearing (see Chapter 13, by Miller et al.).

Among the reasons Indian male industrial workers reported for preferring sterilization to nonterminal methods were dislike of other methods (13 percent), health effects of other methods (7 percent), and their effects on sexual satisfaction (1 percent). Balancing these reasons, among workers preferring other methods instead, were fears about the health effects of vasectomy, its causing weakness, and the dangers of the operation (M. E.

Khan 1977). When male and female sterilization are compared, additional evaluative factors are cited. Fear of health effects seems to be a major reason for choosing one over the other. In the Indian study, the delicacy of the wife's health, possible side effects of sterilization, and the work time the wife might lose were reasons given for preferring vasectomy, whereas side effects for the husband such as pain, weakness, and lost work were arguments for tubectomy (M. E. Khan 1977). An analysis of U.S. women suggests that the spouse who had less fear of sterilization was more likely to be sterilized (Shain et al. 1985).

Ethnic differences in sterilization adoption within multiethnic societies may reflect differences in religious or cultural evaluations, though they may also reflect differential access (see Chapter 8, by Chamrathirong and Stephen; Chapter 7, by DaVanzo et al.). Moral issues involving sterilization are occasionally raised in public debate (e.g., Barrantes et al. 1983), but little direct evidence exists that religion affects sterilization decisions (Philliber and Philliber 1985:3). Although some survey respondents cite religious objections to sterilization, such issues seldom turn up in comparisons of sterilization acceptors with those who prefer other methods. Nevertheless, moral considerations may affect choice when they affect physicians' attitudes or government policies. Surveys in Brazil report 12 to 28 percent of women being refused sterilization by physicians. Physicians' personal beliefs and concerns about the legality of sterilization may be partly responsible; so may be their solicitude for a woman's marital relationship (Liskin and Rinehart 1985:153; see also Chapter 3, by Severy).

Contraceptive access. The spread of sterilization in the developing world is testimony to the effect of increasing access to this method. Simplified surgical procedures for female sterilization, developed in the 1960s and widely disseminated in the 1970s, are also partly responsible (McCann and Cole 1980; Liskin and Rinehart 1985). To some extent, however, female sterilization is merely replacing male sterilization, for which trends are downward, largely owing to program neglect (Ross and Huber 1983).

Differential access to contraception has been suggested as the explanation for the variable relationship between socioeconomic status and sterilization. In more developed countries, sterilization is linked to higher education (Daly and Darroch n.d.:6; but see Chapter 13, by Miller et al.); in less developed countries, however, sterilization is linked more often to lower education. For instance, illiteracy rates among female adopters are particularly high in the Middle East and North Africa, and choice of sterilization is negatively associated with education in Singapore (Green 1978:52). Philliber and Philliber (1985:1) suggest that the poor, unlike the middle class, in some less developed countries have little access to other methods. Statistically controlling for income differences eliminated the negative relationship between education and sterilization in Malaysia (Chapter 7, by DaVanzo

et al.). In more developed countries, sterilization may be easier for the upper classes than for others to obtain, at least until it becomes sufficiently popular.

Differential access may also be responsible for urban-rural differences in sterilization rates, which vary among studies, and which Philliber and Philliber (1985:6) interpret as due mainly to availability. One study in Bangladesh, for instance, found an age difference in urban areas between women adopting sterilization and women first using pills or injectables; in rural areas, where methods were presumably less available, no age or parity difference was found (Swenson and Khan 1983).

Women are willing to travel long distances to be sterilized, but distance may discourage rural women more than urban women. Travel times of up to two hours did not lead to significant declines in adoption among urban women in Thailand and Colombia, though there was some effect in Honduras (Cornelius and Novak 1983:314). For rural women, however, 30 to 45 minutes' travel led to lower adoption in Colombia and Honduras. Nevertheless, distance was less of a constraint for sterilization than for supply methods.

Lack of access to other methods may also affect adoption of sterilization. The relatively large proportions of couples using sterilization in areas of South Asia are due partly to the limited availability of other modern methods. One-third of vasectomy acceptors in a Bangladeshi study said they had accepted that method because they did not know other methods were available (Swenson and Khan 1982:581), and 17 percent of male industrial workers preferring sterilization in an Indian study were unaware of other methods (M. E. Khan 1977).

Sterilization involves a one-time expense, but its cost can still be a major obstacle to adoption. In Honduras, 20 percent of a group of women who wanted to be sterilized, but had not been, cited cost as the reason (Janowitz et al. 1983). Cost was also the barrier cited most often by Brazilian women in seven of nine states (Liskin and Rinehart 1985:185). Lowering the cost can significantly increase use: Liskin and Rinehart (1985) mention that this happened in the Republic of Korea, where in 1976 government policy changed from paying one-third to paying the full cost of sterilization, and in the Netherlands, where health insurance began covering sterilization in 1973. In both cases, reduced cost to the individual, combined with the introduction of laparoscopy or minilaparotomy, produced significant increases in adopters, from 7,000 to 180,000 or more annually in the Republic of Korea and from a few thousand to more than 50,000 annually in the Netherlands.

Promotion is an important factor contributing to the popularity of sterilization in some areas. Some Asian programs provide payments to acceptors, either small amounts given as incentives or in compensation for time and travel costs, or longer-term, often substantial, benefits. Philliber and

Philliber (1985:6) report that many Indian acceptors rejected the idea that payments have influenced them, citing instead the long-term burden of a large family. Nevertheless, appropriate payments do seem to increase acceptors in some settings: the number of requests for vasectomies rose from six to 35 per day when modest payments were introduced in Sri Lanka, and it rose further, to 150 per day, when payments were quintupled (Liskin 1983:91). Of 600 vasectomy acceptors studied in Bangladesh, 27 percent reported adopting that method because of the financial help they received, and another 10 percent out of fear of those who had recommended sterilization to them (Swenson and Khan 1982:581). Payments may override other considerations, as may be the case with men who express regret after having accepted sterilization, mainly for the compensation, or who complain of weakness after being sterilized under some degree of coercion (Swenson and Khan 1982; Liskin 1983:77).

Other aspects of promotion, such as vasectomy camps, may also increase adoption. Medical advice at individual clinics may lean toward one or another method of sterilization, leading to varied adoption patterns (Calan and Hee 1984). Unless it is linked to promotional activities, public policy by itself may have slight effect on acceptance, particularly if it opposes intrinsic trends. For example, Costa Rica tightened its rules in 1976, in response to public concern, to permit sterilization only for medical reasons. Sterilization rates dropped dramatically between 1975 and 1977, but the upward trend was reestablished in 1978 at only a slightly lower level than previously (Barrantes et al. 1983).

Other factors. One other factor related to choosing sterilization does not fit easily into the framework, possibly because it involves several dimensions at once. Two common findings are that couples choosing male sterilization have fewer children than those choosing female sterilization (Green 1978) and that wives of vasectomy acceptors are slightly younger than women who choose sterilization themselves (Philliber and Philliber 1985:3). A supporting finding is that, in Bangladesh, vasectomy acceptors had seldom used contraception previously, unlike tubectomy clients (Swenson and Khan 1983:153-154). One possible explanation is suggested in a comparison of male and female sterilization acceptors in Guatemala: the men had substantially higher educational levels than the women and were more likely to hold white-collar jobs (Santiso et al. 1983). Men who accept sterilization may therefore have smaller family-size preferences or greater competence to act on their preferences than women acceptors. When women have similarly small family-size preferences, they may adopt other methods initially, delaying a sterilization decision, or be less effective at contraception. A difference in competence appears confirmed in a Korean study that found users of male sterilization to have significantly fewer unwanted births than users of other methods (Chapter 6, by Choe and Park).

A related finding was that sterilized men had a lower need for social approval than other men (Philliber and Philliber 1985:7). Paradoxically, men are also reported to seek considerably wider social support before undergoing vasectomy than do women before having a tubal ligation. Speaking with previously sterilized men, in many cases with more than one, is extremely common in the United States among candidates for vasectomy, and the advice of such acceptors is particularly valued (Mumford 1983; Shain et al. 1985; Liskin 1983:90-91; Philliber and Philliber 1985:6). A low need for social approval presumably does not mean low social competence, and men who seek others' advice are following an appropriate path to allaying fears they may have about vasectomy. Men's fears may be greater than women's, despite the relative simplicity of the operation; but another explanation may be that men have less competence and experience with contraception, particularly because they seek the operation at an earlier stage than do women, and that their inexperience leads them to seek wider social support.

CONCLUSION

The structured summary presented in this chapter of determinants of specific contraceptive method choices makes two major points: that the choice of each method involves considerations along each of the four dimensions advanced, and that the four dimensions can encompass most of the determinants previously identified in empirical studies. The framework therefore constitutes one possible systematic approach to investigating choice among contraceptive methods. As a framework, it is not subject to proof or disproof, but this summary has suggested specific hypotheses relevant to each dimension that can be tested.

Dimensions

Whether the contraceptive goal is to limit births or to space them affects the choice of each method considered. Whether the total number of births one wants to avert is also important is less clear. For rhythm, this consideration does not seem to matter, but individual studies suggest that rapid, early childbearing (and therefore a greater potential number to avert) induces choice of the IUD and sterilization. Age and life-cycle patterns are consistent; but one study shows that these patterns, though not the underlying motives, can be dissociated from choice by a balanced presentation of alternatives. Other aspects of goals have been shown to be important mainly for sterilization: the desire for sons, the desire for surviving children rather than simply births, and firmness rather than flexibility in goals.

Contraceptive competence is partly a reflection of education, which has opposing effects on the two less effective methods considered, leading to greater rhythm use overall but less condom use in Japan. For pills, IUDs,

and sterilization, the effect of education is more problematic, sometimes positive and at other times negative, but usually consistent with the argument that either competence or access is the factor at work. Other aspects of competence also affect choice: sexual inhibitions in the use of the condom, competence acquired through experience with the pill and the IUD, lack of competence with other methods together with ability to cope with sequelae of sterilization, possibly marital sharing as providing competence with rhythm, and possibly marital stability as providing competence with sterilization.

For each method considered, concern about the side effects of other methods appears to be a factor in choice. The side effects and inconveniences of the method chosen may be considered less important, or they may be ignored for complex reasons, as in the case of the condom. Moral issues, in contrast, do not seem to exert much influence on choice, except among persons choosing rhythm. A less positive attitude toward contraception in general favors the use of rhythm. In more developed but not in less developed countries, Catholicism also favors the use of rhythm.

Access to a method or to alternatives, finally, appears to be a critical factor in choice, though different levels of access must be attained to induce use of such methods as pills and sterilization. For each method, some data confirm the importance of its cost to the individual. Weighted cost of other methods affects rhythm, for instance, and subsidies substantially increase adoption of sterilization. Higher income typically allows use of the more expensive methods. Typical price variations in the commercial sector, however, may have little effect if contraceptives are also available free. Promotion can increase use of particular methods, as can monetary incentives.

Socioeconomic and demographic characteristics have been part of this review. Some of these characteristics, however, can have variable effects because they may reflect more than one underlying dimension. In addition, the WHO Task Forces (1980) finding that sociodemographic differentials in choice can be erased by equalizing information and access—which is worth verifying in future studies—suggests the need to look behind socioeconomic differentials to the underlying dimensions of choice.

Integration

How are judgments on each dimension harmonized into a single judgment and the eventual choice of a contraceptive method? The only theoretical approach that has been applied so far appears to be subjective expected utility. Under the conditions of the studies using this approach (typically involving U.S. college students, usually predicting intentions rather than behavior, often with ad hoc selection of relevant dimensions, etc.), subjective expected utility models work quite well. But they have been tested only against variants of themselves and not against alternatives. Caution in ac-

cepting these models is advisable because linear models appear to predict behavior well even when they are improper (Dawes 1979). In a predictive sense, therefore, it may not matter whether an expected utility model is accurate. These models also involve questionable assumptions, however, which are routinely demonstrated to be violated in experimental studies (Schoemaker 1982).

Although no alternative model is proposed here, some conditions for such a model can be extracted from the review.

First, judgments of particular contraceptive methods should not be treated in isolation. An adequate model would predict choice from judgments of various methods. This point may appear obvious, but it has often been overlooked in empirical work. Acceptability studies sometimes consist of evaluations of individual methods in isolation, without reference to the comparable or contrasting characteristics of other methods (e.g., Hardy et al. 1983; Satayapan et al. 1983). Many studies of sterilization acceptors do not investigate the possible alternatives (Philliber and Philliber 1985). Several expected utility studies have attempted to predict intentions from composite judgments about specific methods, without reference to judgments about other methods, although Davidson and Morrison (1983) have now shown this to be the weaker approach. The crucial significance of considering other methods is nicely illustrated in Coleman's (1981, 1983) work, where restricted access to and reactions to other methods are shown to contribute critically to the prevalence of condoms in Japan.

Second, under some conditions a model must allow for ruling out specific methods on the basis of a single "defect." For instance, if the intention is to postpone a birth, sterilization methods are almost always ruled out *a priori*. If knowledge of or access to any method is poor—perhaps because a provider decides the method is inappropriate for a client—its use may not even be considered. A lexicographic model for choice, such as elimination by aspects (Tversky 1972), may be needed to deal with such conditions. Since choosing a method may be a complex task, elimination by aspects or some editing process may have further justification. Alternatively, the problem may be seen as that of defining an appropriate "decision frame" (Tversky and Kahneman 1981) within which the problem is viewed, ruling out certain alternatives and focusing on particular dimensions in particular situations.

Often the "defects" of a given contraceptive method are not such as to rule out the method entirely. The third requirement for a model is that it allow tradeoffs across dimensions in such circumstances. For instance, sterilization need not be as accessible as other methods if those tending to choose it are more strongly motivated than those tending to choose other methods. The condom's perceived reduction of sexual pleasure is tolerated in Japan because of a complex set of other considerations. A simple cost-benefit

model, such as subjective expected utility, would of course allow such tradeoffs. The multivariate analyses covered in this review have involved essentially linear combinations of elements, and that fact suggests that such combinations are an appropriate initial approximation.

Beyond the formal requirements for a model for integrating judgments across dimensions are requirements for fitting the model to the reality of individual choices. Method choices can change over time, as contraceptive goals become more definite, as competence at using a method and access to it improve, as experience with a method reveals problems. A useful model for choices needs some way to deal with such changes. Change is also historical: new methods have been introduced fairly rapidly in the past decade or two, the health consequences of several are still under investigation, and methods now available have not yet reached all potential consumers. Novelty of a method affects the pattern of choices, as the variable effects of socioeconomic status on choice apparently imply. A model for choice therefore has to be somewhat open-ended, allowing an extension to new methods and the addition of new information about old methods.

One final issue is whether choices can be modeled individually or whether judgments tend to become widely shared, the various dimensions of choice tend to reinforce each other, and institutions come increasingly to be structured to support particular choices. The confluence of institutions to support a particular choice is well illustrated by condom use in Japan. The evidence is less clear in other cases, but the prevalence of rhythm use in some countries and the spread of sterilization in others may reflect some degree of reinforcement for a given choice when a sufficient number or proportion of those eligible have made it. Adding a term for the social environment to an additive decision model (Fishbein and Ajzen 1975) is one possible solution, but it falls short of capturing the social dynamics. The question of how and why institutional biases develop requires a different type of sociopolitical model.

Consequences

The framework makes clear that the fertility effects of specific methods cannot all be credited to or blamed on the methods themselves. If a method is chosen to meet a particular contraceptive goal, subsequent behavior—such as continuation or discontinuation—should be seen as resulting not only from the method's attributes but also, at least in part, from this original goal (Bauman and Varavej 1972; Jones et al. 1980). Low continuation rates, and eventual higher fertility, may mean that a method is actually being used as the acceptors intend.

Therefore, the common focus on continuation and use-effectiveness in evaluating various methods may be somewhat misleading. Such features cannot be properly assessed without controlling for user intentions and possibly also for other user attributes such as competence.

An alternative approach that departs more radically from current practice is to look not at the method but at the individual, and at the steps the individual takes in using contraception. These steps may be seen as beginning with contraceptive initiation and its timing, followed by choice of an initial method, its continuation or discontinuation, choice of another method, etc. Each step has some effect on eventual completed fertility, but only in the context of steps already taken and partly because of subsequent steps to which it is bound. In this approach, the effect of method choice would be seen in proper context.

A partial illustration of the approach is provided in an eight-country study by Bulatao and Cheung (1986). Timing of contraceptive initiation was indexed by the birth interval within which contraception was first used. Regressions showed that earlier initiation significantly reduced the number of children ever born. When initial method choice was introduced into the regressions (through dummy variables for sterilization, pills, the IUD, and condoms), some limited further effect appeared. Sterilization contributed to an additional reduction in the number of children ever born of about one-third of a child, but the other dummies had variable effects, some positive and others negative, across countries. The findings suggest that method choices may have different consequences in different settings.

Implications

Contraceptive method choice appears to be strongly influenced, but not dictated, by the methods made available by family planning programs. Contraceptive access is a key factor, but not the only determinant; potential users also play an active role in approving, disapproving, shaping, and selecting among the options they have. Many survey respondents appear to have definite method preferences (Cornelius and Novak 1983:307). By the time they reached a clinic, 99 percent of women in one study had a preconceived choice, and few changed their minds (Chumnijarakij et al. 1981). The availability of preferred choices may therefore influence contraceptive prevalence more than the general availability of all methods (Cornelius and Novak 1983).

An understanding of the reasons behind choices should therefore be useful to suppliers in allowing them to fit the methods they provide more closely to client intentions. To have "all medically approved and appropriate methods" available in order "to ensure a voluntary and free choice" is an ideal recommended by the 1984 International Conference on Population in Mexico. No program attains such universal availability, but satisfactory availability may be more attainable with a better understanding of choices.

If a need exists to promote specific methods, this review suggests that simply increasing the supply may be useful, but other measures would also contribute to a realization of that objective. Attempts to influence contracep-

tive goals, increase competence at using contraception, and improve evaluations of specific methods could also help redirect choices.

The effect on fertility of facilitating better choices is not entirely clear. The argument has been made that each new method attracts new clients, adding another layer of contraceptive use (Freedman and Berelson 1976; Potter 1971). The motivations behind choice and the linkages among contraceptive behaviors should also be considered, and the eventual effect on fertility therefore requires further investigation. As service providers, however, family planning programs should be concerned not only with fertility effects but also with service quality and client satisfaction. From this perspective, facilitating better choices is a worthwhile goal in itself and should eventually provide dividends.

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APPENDIX

307 15 Multinomial Logit Analysis of Contraceptive Method Choice

by Minja Kim Choe

The multinomial logit model can be used to assess the effects of independent variables on a multicategory dependent variable. The model has been applied to analyze choice of occupation and choice of mode of transportation (McFadden 1974; Schmidt and Strauss 1975; Theil 1969). It is used by several authors in this volume to identify determinants of contraceptive method choice.

THE MODEL

The model is a generalization of the binary logit regression model. Suppose that the dependent variable y takes one of the mutually exclusive and exhaustive categories 1, 2, ..., J . Let p_j be the probability that $y = j$. With x_k ($k=1, 2, \dots, K$) as predictors of y , the multinomial logit regression model specifies

$$\ln [p_j/p_I] = \sum_{k=1}^K b_{jk} x_k \quad \text{for } j=1, 2, \dots, J. \quad (1)$$

Because the categories 1, 2, ..., J for the dependent variable y are mutually exclusive and exhaustive, we have $\sum p_j = 1$. With $b_{Jk} = 0$, the above model determines the coefficients b_{jk} uniquely. The choice of J , to be called the reference category, is arbitrary and does not affect the results (Maddala 1983:35).

The model requires the independence of irrelevant alternatives (IIA): the odds ratio for the i th versus the j th category should be unaffected by the total number of categories (J) because Equation 1 has no reference to this number. Expanding the number of categories for the dependent variable should not change the odds ratios among the existing categories.

INTERPRETATION OF COEFFICIENTS

The coefficient b_{jk} in the model is the change in the logarithm of the odds for event $y = j$ versus $y = J$ when the independent variable x_k increases by one unit.

For any pair of categories i and j , we have $p_i/p_j = (p_i/p_I)/(p_j/p_I)$, and therefore

$$\ln (p_i/p_j) = \sum_{k=1}^K (b_{ik} - b_{jk}) x_k. \quad (2)$$

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Thus, once coefficients are estimated with any category used as a reference, coefficients using any other category as a reference can be calculated simply by subtraction.

From the coefficients, the expected probability P_j for any outcome j can be computed for all combinations of values of independent variables by

$$P_j = \exp\left(\sum_{k=1}^K b_{jk} x_k\right) / D, \quad \text{for } j = 1, 2, \dots, J \quad (3)$$

where

$$D = 1 + \sum_{j=1}^{J-1} \exp\left(\sum_{k=1}^K b_{jk} x_k\right).$$

For illustration, results from the multinomial logit model used in Chapter 6 for the analysis of Korean data are used. The dependent variable is the contraceptive method currently used by each couple exposed to the risk of conception. There are nine categories for the dependent variable, including no method, which is used as the reference category. The model has 17 independent variables, only two of which are considered here. The first independent variable is the *number of (living) sons*, from zero to two or more. The second, *child death*, indicates whether the couple has had a child die. Table 15.1 shows the multinomial logit coefficients, and Table 15.2 and Figure 15.1 show the expected proportions using various contraceptive methods estimated from the model. In computing Table 15.2, I assumed all other variables in the model to have sample mean values.

In Table 15.1, the coefficient for *number of sons* for condom use versus use of no method is 0.0743. Because $\exp(0.0743) = 1.08$, women with one son have 8 percent higher odds of choosing the condom over no method than have women with no sons. The coefficients are relative, however; hence, the probability of being in the first category does not necessarily increase as the independent variable increases when the coefficient has a positive sign. Table 15.2 shows that the proportion of women using the condom drops from 7.44 percent to 6.99 percent as the number of living sons changes from zero to one. This happens because, as the number of sons increases, the likelihood of being in the reference category, using no methods, also drops from 24.82 percent to 21.65 percent.

ESTIMATION AND TESTS OF SIGNIFICANCE

The coefficients of the multinomial logit model can be estimated by means of the maximum likelihood method. Several computer programs are available for this purpose, although they are not widely known.¹ Each coeffi-

1. One program is MLOGIT, which can be added to the Statistical Analysis System (SAS) package. It is available from Salford Systems, 3672 Caminito Cielo del Mar, San Diego, CA

Table 15.1. Multinomial logit regression coefficients and *t*-statistics for contraceptive method choice: Republic of Korea, 1979
(Reference category = no use)

Independent variable and method	Coefficient	<i>t</i> -statistic
Number of sons		
Pill	.0685	(0.62)
Condom	.0743	(0.59)
IUD	.244	(2.42)
Female sterilization	.366	(3.89)
Male sterilization	.330	(2.79)
Rhythm	.0280	(0.26)
Withdrawal	.0212	(0.15)
Other	.0287	(0.13)
Child death		
Pill	.0438	(0.19)
Condom	-.0982	(-0.38)
IUD	-.243	(-1.18)
Female sterilization	-.221	(-1.15)
Male sterilization	-.346	(-0.43)
Rhythm	-.166	(-0.74)
Withdrawal	.507	(1.74)
Other	.246	(0.55)

Source: Chapter 6.

Note: The model includes 15 additional factors not shown.

cient can be tested for significance using the *T*-ratio statistics, and the overall significance of the effect of one variable x_k , consisting of $J-1$ coefficients $b_{1k}, b_{2k}, \dots, b_{J-1,k}$, can be tested by the likelihood ratio statistics. It is possible that none of the coefficients $b_{1k}, b_{2k}, \dots, b_{J-1,k}$ using category J as the reference is significant, but the simultaneous test for all of b_{jk} is significant. This will be the case if some coefficients are significantly different from some others. In that event, if a different reference category is selected, some coefficients will become significant. The independent variable *child death* in Table 15.1, for example, shows insignificant coefficients. In Table 15.3, however, where other reference categories are used, the coefficient for withdrawal is shown to be significant when compared with that for the IUD, female sterilization, or male sterilization.

92130, U.S.A. Another is LIMDEP, available from William H. Greene, Department of Economics, Graduate School of Business Administration, New York University, 100 Trinity Place, New York, NY 10006, U.S.A.

Table 15.2. Expected proportions using specified contraceptive methods, estimated from the multinomial logit model: Republic of Korea, 1979

Method	Total	Number of sons			Child death	
		0	1	2+	Yes	No
No method	.2031	.2482	.2165	.1848	.2193	.2010
Pill	.1068	.1184	.1106	.1011	.1199	.1052
Condom	.0676	.0744	.0699	.0642	.0668	.0676
IUD	.1464	.1265	.1408	.1534	.1269	.1484
Female sterilization	.2055	.1493	.1878	.2312	.1818	.2079
Male sterilization	.0861	.0658	.0799	.0948	.0680	.0881
Rhythm	.1185	.1392	.1249	.1096	.1102	.1192
Withdrawal	.0503	.0597	.0532	.0463	.0859	.0474
Other	.0157	.0184	.0165	.0145	.0211	.0151

Source: Chapter 6, Table 6.5.

Note: Proportions were estimated from the full model, including 15 additional factors.

The overall significance of the model can be tested with the likelihood ratio statistics. A pseudo R^2 (Maddala 1983:37-41) can be used for goodness of fit.

When all independent variables are considered to be categorical, the multinomial logit model is equivalent to the log-linear model. To estimate the multinomial logit coefficients, the best-fitting model is searched for among those that treat the K -dimensional marginal totals for the K independent variables as fixed. The expected odds ratios are then calculated from the appropriate ratios of expected cell frequencies (Fienberg 1981:110-116). The advantage of using the log-linear model is that the full structural relationships among the independent variables are taken into account by the model. A major disadvantage is that the model becomes prohibitively complex as the number of categories increases. Another disadvantage is the loss of information when interval variables have to be recoded into discrete categories.

A typical application of the multinomial logit model involves many independent variables and many categories for the dependent variable. For a model with K independent variables and J categories of dependent variables, $K \times (J-1)$ coefficients have to be estimated. A model with 10 independent variables and five categories of the dependent variable requires estimation of 40 coefficients. It can be seen that computation is not trivial with the maximum likelihood method, which is iterative.

An alternative way of estimating coefficients was developed by Haggstrom (1983), who showed that, when the independent variables are distributed as multivariate normal, unbiased estimates of the coefficients can be obtained by a simple linear transformation of the coefficients of a set of or-

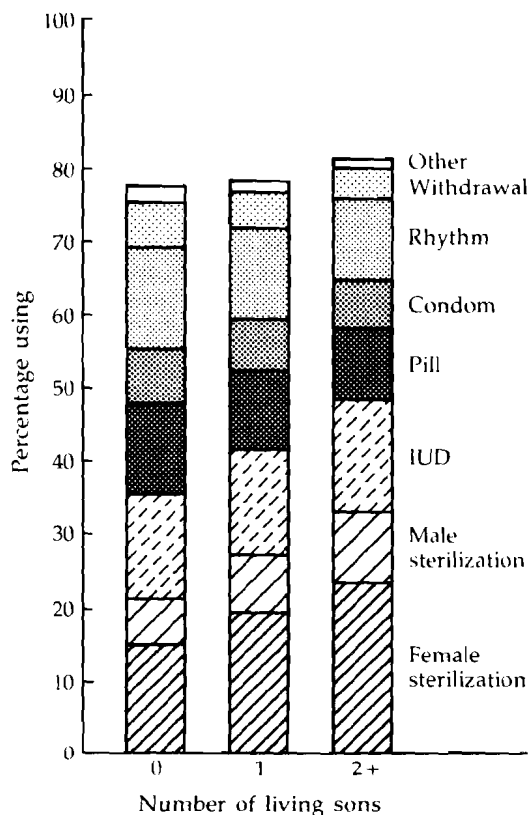


Figure 15.1. Women's contraceptive method choices, by number of living sons: Republic of Korea, 1979

dinary least squares regressions. Although independent variables may seldom be distributed as multivariate normal, estimates by this procedure are quite robust to this violation. When the Haggstrom method is used, each coefficient can be tested for significance with *T*-ratio statistics, but no statistics are available for the overall test of the model or for the simultaneous test of $J-1$ coefficients attached to one independent variable.

APPLICATION

In applying the multinomial logit model to contraceptive method choice, it is necessary to examine carefully some assumptions of the model. The assumption of mutual exclusiveness and exhaustiveness of the choices does not pose a serious problem. For couples who may use more than one method concurrently, a choice has to be made about which method should be chosen as the one used.

Table 15.3. Multinomial logit coefficients for the factor *child death*, for all possible contrasts of contraceptive methods: Republic of Korea, 1979

	Pill	Con- dom	IUD	Female sterili- zation	Male sterili- zation	Rhythm	With- drawal	Other
No method	.0438	-.0982	-.243	-.221	-.346	-.166	.507	.246
Pill		-.142	-.287	-.265	-.390	-.210	.463	.202
Condom			-.145	-.122	-.248	-.0678	.605	.344
IUD				.022	-.103	.077	.750*	.489
Female sterilization					-.125	.055	.728*	.467
Male Sterilization						.180	.853†	.592
Rhythm							.673	.412
Withdrawal								-.261

Source: Chapter 6.

* $p < .05$.

† $p < .01$.

The assumption of independence of irrelevant alternatives is important for special applications of the multinomial logit model. The multinomial logit model can be extended to include characteristics of specific contraceptive methods (see Chapter 5, by Schwartz et al., as an example). Such a model can then be used to predict the use of a new method with given attributes. For example, a model can be estimated with contraceptive prices, whether the methods require a visit to a physician, and the degree of discomfort caused by each method. When a new method becomes available that has a new price, requires no visit to a physician, and causes no discomfort, we can predict the probability of using the new method from the estimated model. For this application, the independence of irrelevant alternatives is assumed. Unfortunately, little is known about the robustness of the model when this assumption is violated.

Another consideration to be made when applying the multinomial logit model to the analysis of contraceptive method choice is whether "no method" should be treated as one of the choices. On one hand, one may reason that couples make decisions about contraceptives in two stages; first, whether to use any method, and second, which method is best. If this is the case, the analysis should include contraceptive users only. On the other hand, couples may decide to contracept if a specific method they favor, such as an injectable, is available. Another difficult question is whether it is appropriate to consider couples who chose to be sterilized in the past as still having a choice about current use.

In some analyses, the independent variables may be affected by the contraceptive method chosen, as well as influencing this choice. The number

of children a couple has may affect the use and choice of contraceptives, and the use of contraceptives also affects the number of children by preventing undesired pregnancies. At present no statistical methods for simultaneous treatment of such effects are available.

PRESENTATION OF RESULTS

The usual presentation of the multinomial logit results includes a table of coefficients, with each choice being compared with a single reference category. Such a table is difficult to interpret and may not show some important contrasts between different categories. Presentation of coefficients for all possible contrasts is preferable. Because the resulting table can be prohibitively large, simply presenting the level of significance for each contrast is an alternative. (See Table 6.4 in Chapter 6.) If actual coefficients are given relative to a single reference category, other coefficients are readily computable.

It is also desirable to present the implications of the multinomial logit coefficients in terms of expected probabilities, as in Table 15.2 and Figure 15.1.

References

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